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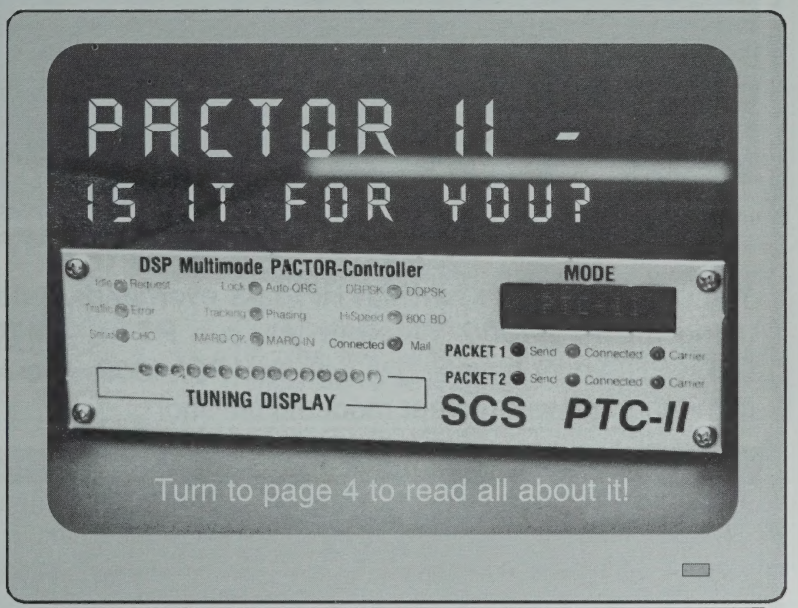

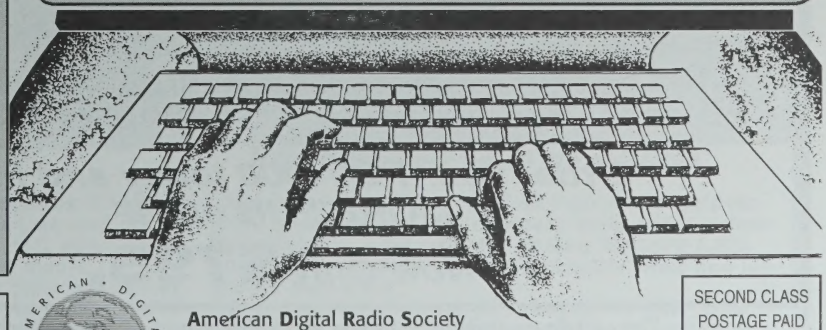

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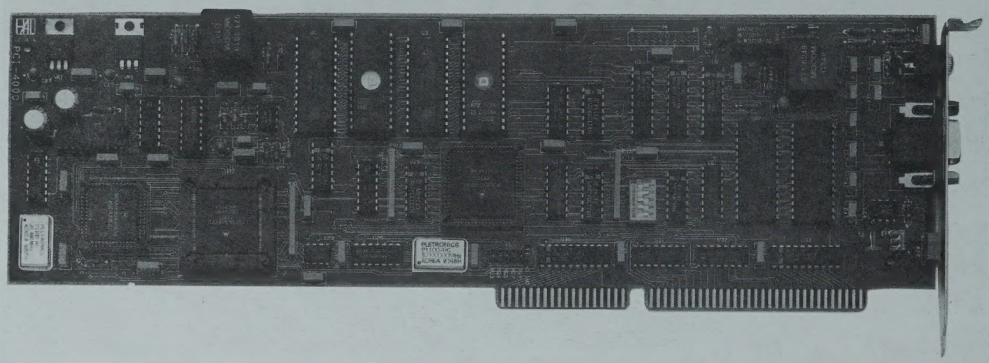

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Pactor II - Part I

The New Dimension in Data Transmission Technology

by Dr. Tom Rink, DL2FAK and Hans-Peter Helfert, DL6MAA

SCS Communications • Röntgenstraße 36 • D-63454 Hanau • Germany

This is the first of a series of three parts that describes the PACTOR-II system and the ideas behind it. In this first chapter, we will explain some important technical fundamentals that everybody has to be aware of, to understand the advantages of the new protocol. The second part, which will be published in the February issue, describes the PTC-II hardware. The third part, with details on the PACTOR-II protocol, follows in the March issue. Finally, in the April issue, we will answer questions on the system that have accumulated at the ADRS in the meantime. Please send your questions to ADRS at the Goldenrod, FL address.

I. Introduction

PACTOR was designed more than five years ago in Germany, in order to overcome the known disadvantages of AMTOR and Packet Radio. PACTOR is a cheap and reliable means of fast, robust and error-free data transfer over short wave links, and does not exceed the usual 500 Hz bandwidth limit for digital modes. For the first time, not only the complete ASCII character set, but any given binary information could be transferred over short wave, even in very poor propagation conditions. Another aim of the system development was the utilizing of inexpensive and available hardware. Since 8-bit controllers without Digital Signal Processor chips (DSP's) were state of the art at that time, Frequency Shift Keying (FSK) had to be chosen as a modulation method. Up to now, PACTOR with analog Memory-ARQ is still the most robust digital mode used in Amateur Radio. It is also still the fastest FSK mode that fits into a 500 Hz channel. These may be some of the reasons that have made PACTOR a standard, now included in virtually all short wave modems in the Amateur Radio market, and also widely used in the commercial world.

In the meantime however, more powerful CPU's and DSP's have been developed. Processing power that greatly exceeded the financial limits of the average Radio Amateur a few years ago, has dropped to an acceptable price. Some of the current high-end modems for short wave operation already include a DSP, and in a few years you can expect all new modems to contain these chips. The throughput within a 500 Hz channel, as well as the robustness of a system can still be dramatically improved, by using modulation methods different to FSK, combined with powerful error control coding algorithms. A new standard that takes advantage of the forthcoming hardware generation is thus required.

These considerations have led to the development of PACTOR-II. This is not 'another new mode', but a fully backwards compatible improvement to the current PACTOR protocol, with automatic switching. As there are already several companies interested in licensing PACTOR-II, the German development group made sure that an implementation in units different from the original PTC-II will also be possible. However, using a less powerful hardware means sacrificing at least a considerable part of the weak signal performance of the system.

II. Modulation Methods

1. Frequency Shift Keying (FSK)

FSK was the first teletype modulation method used, and is still by far the most widespread one. The information is encoded using rectangular pulses, represented by an interleaved ON/OFF keying of two carrier frequencies. The symbol rate is defined as fraction 1/T, the so-called baud rate. T represents the symbol duration. In FSK systems, the typical wide spectrum that could be expected when modulating a rectangular baseband signal on a carrier, is cancelled out by avoiding phase discontinuities between successive pulses. Thus only the main lobes around the two carrier frequencies are dominant. The amplitude of a 200 baud signal at 500 Hz bandwidth is about 30 dB smaller than the amplitude in the center of the spectrum. If however, the baudrate is increased, the bandwidth of the main lobes will naturally also increase. A 300 Baud signal (see figure 1), for example, clearly exceeds the 500 Hz bandwidth, hence an ordinary CW filter cannot be applied without distorting the pulses. This greatly deteriorates the performance and thus also the Bit Error Rate (BER) of the system. Additionally, signals with higher baud rates suffer from a significant loss of immunity against time smearing (see below). For these reasons, 200 baud is commonly considered to be the maximum useful symbol rate of 2-tone FSK systems, operating over short wave links. Additionally, with regard to the over-crowded frequencies, all new systems should generally require not just a narrow bandwidth, but provide an improved spectral efficiency to obtain a higher throughput. We have therefore to look for a different approach, instead of using FSK.

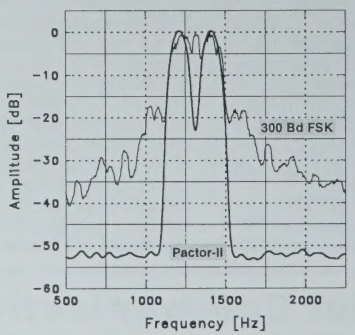

Figure 1: 2-Tones 100 Bd DPSK (Root Raised Cosine) and 300 Bd FSK Spectra / 200 Hz Shift

2. Phase Shift Keying (PSK)

In PSK systems, the phase of a signal is used as a means of the information transfer. However, as the HF propagation conditions sometimes change quite rapidly, it is very difficult to track the absolute phase of a signal. Therefore it has proven to be much more efficient to utilize the phase difference between successive pulses. This requires a slightly higher Signal to Noise Ratio (SNR), but in return, the resistance against multipath effects is dramatically increased. Modulation that employs phase differences between successive pulses to encode the information is called Differential Phase Shift Keying (DPSK). If there are only two possible phase differences, signalling logical one and zero, the modulation is called Differential Binary Phase Shift Keying (DBPSK). If there are four possible phase differences, signalling logical dibits, it is called Differential Quadrature Phase Shift Keying (DQPSK). For example, with a one-tone 100 baud DQPSK signal, 200 bit/sec. can be transferred. If more phase differences are distinguished, the corresponding systems are called 8-DPSK, 16-DPSK, etc.

As phase shift keying naturally implies phase discontinuities between successive pulses, the spectrum of a DPSK system with hard keying shows the typical strong side-lobes of a rectangular pulse spectrum. The amplitude of a hard-keyed 100 baud DPSK signal is only around 15 dB smaller at a cut-off frequency of +/- 250 Hz than in the center of the spectrum. Thus hard keying must not be used on short wave due to the resulting large bandwidth. To avoid this problem, the baseband signal of a PSK system must be specifically prepared before it gets as far as being modulated on the carrier. This is done by transforming the rectangular pulses containing the binary information into suitable wave forms, using special shaping algorithms. H. Nyquist has designed a pulse with very useful properties, the so-called raised-cosine pulse, which does not produce any spectral spillover. These pulses do not produce any intersymbol interference either, since their amplitude is zero at the sampling time of successive pulses (see figure 2). Thus they can be overlapped without any interference between them, even if the pulses are four times longer than the corresponding rectangular pulses. This is the reason why a very high information density and a good spectral efficiency can be obtained using raised-cosine pulses. Since a raised-cosine DPSK signal with a symbol rate of 100 baud only occupies a bandwidth of around 200 Hz at minus 45 dB, it is obvious that two of these signals can be placed together into a 500 Hz channel. The resulting system is called

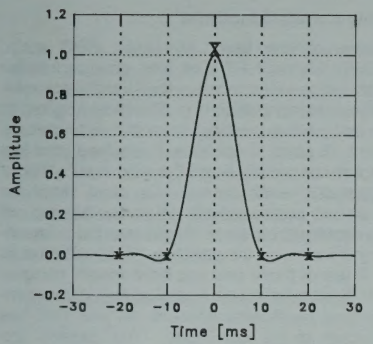

Figure 2: 100 Bd Raised Cosine Pulse, x marks sampling times

two-tone-DPSK. It can robustly transfer 400 bit/sec. within a bandwidth of less than 500 Hz if DQPSK is applied, or up to 600 bit/sec. within the same bandwidth using 8-DPSK. Figure 1 also includes the spectrum of a two-tone-DPSK system.

III. Robustness

The simplest test of the robustness of a modulation system is the measurement of its behavior in presence of Arbitrary White Gaussian Noise (AWGN). DQPSK is known to be more robust than FSK, though it also has a better spectral efficiency. For example, to obtain a BER of 10E-4, the required SNR per bit is 10.7 dB when using DQPSK, but 12.3 dB when using FSK. DBPSK requires an even smaller SNR of 9.3 dB in that case, and is thus the most robust mode mentioned. It is also important to remember that signals with many levels, e. g. 16-DPSK, require more energy per bit than DBPSK or DQPSK. Generally, a compromise has to be found between the symbol duration (i. e. the baud rate) and the number of bits that each symbol has to carry. Short symbols do require a greater bandwidth, but a high throughput can be achieved with only a few levels per symbol. As a result, the signal is more robust against AWGN than a system with the same throughput using longer symbols and more levels. On the other hand, short symbols are very susceptible to time smearing (see below) and require a higher bandwidth. DQPSK with 100 baud has proven to be a very good compromise between robustness against AWGN and time dispersion, especially if it is combined with powerful error control coding.

Another very important point for a short wave communications system is the resistance against multipath effects, which occur if there is more than one path between transmitter and receiver. Due to the various delays at the receiving end, the combination of the different received signals does not result in a copy of the original signal, but in a more or less distorted wave form. Three major multipath effects can be distinguished: time dispersion or 'time smearing', frequency dispersion and selective fading. These three effects are closely related to each other. They are strong if the frequency used is much below the maximum usable frequency, and if the distance is long. A single hop path on the 20 m band, for example, normally does not suffer from severe multipath effects. However, a DX link on the 80 m band at night often provides strong multipath problems.

The short term time jitter has a magnitude of up to 5 msec. Larger time smearing can only be observed under very special conditions of the ionosphere. A baud rate of 100 symbols per second has proven to be low enough for almost all possible propagation conditions, especially if powerful error control coding is applied. Frequency dispersion means that the frequency of the original signal is shifted on the path between transmitter and receiver. It is the same effect as the so-called Doppler shift, which can be observed on signals from low orbit satellites. The magnitude of the Doppler shift on normal short wave paths is only a few Hertz, thus it does not influence ordinary FSK systems. However, the demodulator of a PSK signal needs a very accurate information on the carrier frequency in order to work properly. A DQPSK system with a symbol rate of 100 bit/sec. can only deliver a correct output, if the frequency error is less than +/- 12.5 Hz. Automatic frequency tracking must therefore be applied, which can easily be done on a DSP. The PACTOR-II signal, for example, can automatically be tracked by the PTC-II within an offset range of +/- 100 Hz. Longer symbols and more levels of a DPSK signal require a much higher frequency accuracy. For example, a 32 baud 16-DPSK signal, as used in CLOVER-II, needs an accuracy of better than 1 Hz. Thus even small Doppler shifts deteriorate the demodulation process, because it is not possible to track the frequency fast enough at such a high accuracy.

Selective fading, the third multipath effect, mainly influences FSK systems, as the channel with lower SNR determines the BER of the whole system, if the converter cannot switch to space-only mode. The symmetrical property of a binary FSK signal is destroyed by selective fading. PSK modulation is quite robust against this effect.

IV. Intermodulation Products and Crest Factor

Whenever a signal, consisting of two or more parallel carriers or 'tones', has to pass through a non-linear stage, intermodulation products are generated. Special attention has to be paid to the third order products, because they are located relatively close to the original signal components. The final RF power stage(s) of the average Amateur Radio transmitter, are capable of a third order intermodulation performance of about minus 30 dB. A two-tone signal with a shift of 200 Hz thus produces third order intermodulation products that are located virtually within the original bandwidth of the signal. This means that there will not be any interference on adjacent channels due to intermodulation effects. However, a signal consisting of four tones that are spaced at 125 Hz, will be broadened to around 1100 Hz of bandwidth at minus 30 dB when passing through the same stage.

Another item that has to be considered is the Crest Factor, which is defined as the ratio of maximum signal amplitude to average signal amplitude. Modulation systems designed for radio frequencies should always have a low Crest Factor, so that the peaks of the signal wave form do not overdrive the final RF stages. Among other considerations, the Crest Factor is influenced by the number of tones used by a system. The more tones that are used, the more difficult it is to get a low Crest Factor. It is in addition, also influenced by the modulation method. PSK, for example, leads to a lower Crest Factor than Amplitude Shift Keying (ASK).

V. Error Control Coding

The use of a reliable modulation system is only one of the essential steps towards the goal of optimum data transmission over the difficult paths encountered on HF radio. Dramatic improvements can also be obtained by correct preparation of the data before it gets as far as being transmitted by the modem. To be effective, this process, known as Error Control Coding (ECC), imposes very high computing demands on the system processor. Actually the final limit of achievable transmission reliability depends solely on the processing power used for the ECC. The more power available, the closer the theoretical throughput limit, the so-called Shannon Boundary, can be approached.

The basic idea behind this coding is quite simple: A certain number of redundant bits is appended to the original information that has to be transmitted through a noisy channel. The redundant bits are generated from the original data by applying special rules, depending on the chosen code. Data and redundancy then form a new string of bits, which is called a code word. The ratio of the number of information bits and the whole length of the code word is called code rate. The number of valid code words is obviously less than the number of possible code words. A good code and the corresponding encoding process must produce only those valid code words which have a maximum mutual hamming distance, that means a maximum number of different bits. This maximum mutual distance then allows code words to be recognized and distinguished, even in the presence of received errors. For example, if the valid code words of a specific code have a minimum mutual hamming distance of three, each code word containing a single error can be corrected, as the only valid code word with the greatest similarity then represents the correct one.

Two main approaches of ECC can be distinguished: block codes and convolutional codes. Both always require data interleaving to be effective on channels with burst errors. When applying block codes, the message or packet is divided into short blocks containing only a few bits. Each short block is then encoded separately and forms a relatively short code word. Popular block codes are the Golay code, the Hamming codes and the Reed-Solomon

(cont'd on page 7)

Packet Power

Nodes vs. Digis

©1995 by Dave Wolf, WO5H dba Maingate Resources
P.O. Box 189, Burleson TX 76097-0189 / CompuServe ID: 73427,2246

On your local crowded two-meter packet channel, you say you can't connect directly to your home BBS? No problem, just connect via that convenient digipeater that someone has so generously installed on a 300-foot commercial radio tower (or building or water tank or hilltop)! When you connect to a station VIA another station (example: C W5IYVV WA6GVD), that is digipeating. Notice lots of retries and observe the multitude of REJECT frames on your monitor until eventually you see a 'TIMED OUT' message on the screen? Ever sit there wondering why this happens and if there is a better way just short of pulling the proverbial plug?

If you are just getting your feet wet in VHF packet and are a little frustrated by making it work, you will make a significant step forward if you follow this advice: Forget about digipeating. Use a node instead!

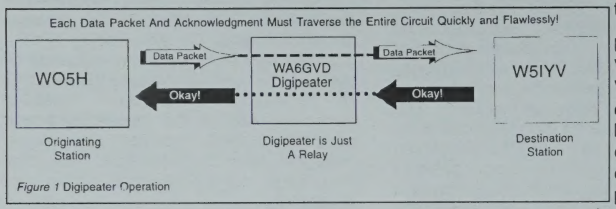

Figure 1 Digipeater Operation

The digipeat function is as old as packet itself. This was included in the basic packet firmware because in the beginning there was no networking software. The developers of packet so wisely figured that to increase the likelihood of success in packet, each TNC could be used to digitally repeat or digipeat the packets of other stations that were not within direct 'earshot' of each other. This digipeat feature would be available (and could be disabled, if desired, by the user) until real networking schemes were developed if the mode became popular. Packet **did** become popular, and **true networking schemes have been created**. If you've heard of NETROM, ROSE, TexNet, X1J or Ka-Node, you are already on a first-name basis with packet networking!

The text books ought to be telling folks to turn the digi function *off.* Unfortunately, the packet 'how-to' books still talk about digipeating as if it were some state-of-the-art function. Simply put, "it ain't!" The text books ought to be telling folks to turn the digi function off, and novice network builders ought to disable the digi function on all of their nodes. New packeteers and old hands alike still 'digi' to make connections — and wonder why they have collisions and frequent time-outs! Not only do they suffer in the attempt, but digipeating activity on a channel creates congestion for all other users.

How a digipeater functions

A digipeater retransmits your packet to the desired station which must then send an acknowledgment to your station (through the digi) that your packet was received (see Figure 1). On a quiet frequency going through one digipeater with a strong path along each leg of the circuit, this usually isn't a challenge. What if the digipeater's antenna is on a 300-foot tower and you're on the plains of Kansas? That digi is going to be 'hearing' stations easily within a 100 mile radius. Before frequency clears so that the digi can repeat your frame to the intended station, your TNC will assume that the packet was lost and sends it again. This might happen again and again until your TNC assumes the connection has been lost. It will disconnect automatically! You'll see the dreaded "CONNECTION TIMED OUT" message! Imagine how this can be compounded when you attempt to maintain a connection through more than one digipeater, or when there is a band opening!

How a node functions

Nodes of any flavor (Ka-Node, BPQ node, ROSE, TexNet, NETROM, X1J, etc.) work better than a digipeater because they handle acknowledgments more efficiently. The most fragile part of any packet connection is the acknowledgment. It says, in essence, "I received your last packet completely, send the next one." With a digipeater, each frame you send must be acknowledged by the distant station and it must be handed off between each part of the circuit without error. If packet or the acknowledgment is disrupted anywhere along the path, your TNC will have to repeat the last packet. A few of these and you have instant congestion all along the network, plus you're bound to end up losing your connection. A node connection is significantly different. All your TNC has to deal with is its connection to the local node. Your packets are acknowledged by the local node and NOT by the distant station to which you are connected (see Figure 2). Each node-to-node connection works in this same, highly efficient manner!

Acknowledgments are only necessary between each leg of the connection. If there is a difficult part of the circuit, repeats will ONLY be made along that section of the circuit and not the entire circuit. If the connection is broken, each link is broken neatly and without tremendous, congestion-causing fanfare. Man, this makes sense!

Now that you know that nodes provide a significant improvement to VHF packet operation, it's time to retrain that reflex action to connect VIA another station. Connect first to a node, then instruct the node to connect to the desired station. If you must use several nodes between you and the desired station, you may have to make several daisy-chain connections between nodes to establish the path; this depends upon the type(s) of software used by the nodes along the path between you and the desired station. I promise you that your throughput will increases tremendously, especially on busy channels.

Most 'service providers' (the folks who have set up nodes and digipeaters) probably haven't given the matter of node or digi a second thought. Chances are their stations are set up to provide connections both as nodes and digipeaters. You determine which you use by

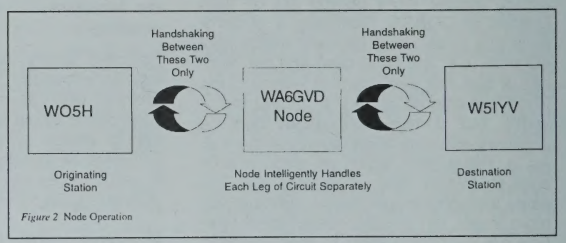

Figure 2 Node Operation

whether you connect VIA (digi)a service provider, or connect to it then connect to the desired station in a two-step process (node). The ROSE node is a little different. Details on how to use the various nodes will be the focus of a future Packet Power column. If they disabled the digi function, channel efficiency would increase quite a bit. If you are a service provider, I strongly suggest that you disable the digipeat function of your node to 'gently force' your users to start using the power of the networking software to increase channel efficiency. Share this concept with other service providers in your region, too. It could be that they just aren't aware of how much inefficiency they are creating by allowing end-to-end acknowledgments and inevitable communications failure.

Packet Power Q & A

Have a question about your packet setup or some facet of the packet world that is troubling you? You'll enjoy the next installment of the Packet Power column! Every other month we will select several letters with questions about the world of packet radio and answer them here. Sorry, due to the volume of correspondence, only letters selected for publication will be answered. Please send your question to Packet Power, P.O. Box 189, Burleson, Texas 76097-0189. I'm looking forward to hearing from you soon. Until next time, keep using your Packet Power!

(Pactor II - cont'd from page 5)

code. Block codes can easily be implemented as they often show a cyclic property and thus do not require much processing power. However, they have proven to be relatively weak, especially if the BER is high. They are only able to correct a few errors in each code word and thus do not provide any benefits in very noisy channels or poor propagation conditions. Additionally, it is very difficult to utilize soft decision when using block codes. Soft decision means that the decoder does not only use binary decisions for the error finding process, but also the analog values provided from the demodulator section. It works similar to the analog Memory-ARQ of PACTOR and requires an ADC or DSP.

Table 1: Comparison of some Error Control Codes.

Type of Code	Coding Gain (db)	
	at BER=10E-5	at BER=10E-2
Convolutional Code[1] (rate/2, k=3)	3.76	1.72
Convolutional Code[1] (rate/2, k=9)	6.77	3.82
Convolutional Code[1] (rate/2, k=13)	8.02	4.91
Golay Code (24,12)	1.92	0.02
Reed-Solomon Code (rate/2, m=8)	3.66	-1.18[2]

(k=constraint length, m=code dimension)

[1] Viterbi decoded with soft decision

[2] Negative coding gain means that the code worsens the perfomance in comparison with the uncoded system

If convolutional codes are applied, the entire message or packet is encoded and the resulting code words are longer than the original packet. These codes are very powerful, and their efficiency is only limited by processing speed. The complexity of a convolutional code mainly depends on the length of the tapped shift registers, which work as binary convolver and represent the heart of the convolutional encoder. This specific number is called constraint length. It provides an upper boundary of the coding gain that can be achieved by a convolutional code. Several methods have been developed for the decoding process of these codes. The optimum decoder, which allows maximum likelihood decoding, is called the Viterbi-Decoder. Unfortunately, the relationship between constraint length and complexity of a Viterbi-Decoder is not a linear one, but it increases exponentially. Real-time applications of Viterbi-Decoders were limited to quite short constraint lengths for a long time due to slow processor speeds. Nowadays, using the new generation of DSP's, it has become possible to apply constraint length 9 or even higher convolutional codes. As a major advantage of convolutional codes and the Viterbi-Decoder, soft decision may be implemented and only slightly increases the complexity of the system. Table 1 shows the achievable coding gains of different block codes as well as convolutional codes depending on their constraint length. PACTOR-II, as implemented in the original German PTC-II, applies a convolutional code with constraint length 9 and soft decision.

WinLink software now available for downloading

This message is sent to all who have inquired about the next WinLink release. Version 1.0 is now available for downloading at the following BBS:

1. Compuserve, HamNet Forum, Library 9, file WINL10.EXE
2. The ADRS BBS: 813-922-5904
3. Hi-Tech BBS: 706-694-3295

Anyone needing a diskette copy may contact Angelo (W5KSI). He has volunteered to handle that task for a nominal fee to cover his expenses.

Thanks for patiently waiting.

73, Hans - N8PGR

Hits & Misses

Are We On Track?

by Dale Sinner, W6IWO • 1904 Carolton Ln • Fallbrook, CA 92028
CompuServe ID: 73074,435

Have you had one of the following incidents happen to you recently?

1. You are driving down the street and approach an intersection. Just as you close on the intersection, someone comes around you and cuts you off to make a turn in front of you.
2. You are driving on an expressway in the fast lane. Someone comes up close behind you but you cannot move over at that instant because of heavy traffic. Eventually you get a chance to move over, and when you do, the person behind you passes you by and gives you the one finger salute.
3. You are in the grocery store to pick up a few items. Since there are less than ten items in your cart, you approach the fast check out line for a speedy exit. There is a big sign posted, saying ten items or less. In front of you is a person with a cart full of groceries, and you say nothing, nor does the clerk. So the fast line now becomes the slow line and you are upset.
4. You go to a local computer store to inquire about a new model computer they have on sale. When you find a clerk to help you and explain why you are there, the clerk goes into his pitch about the computer on sale. All goes well until you ask a question that indicates you are not to computer knowledgeable. At this point, the clerk insults you by treating you as child with no education.
5. You are an adult walking down the street. Approaching you is a group of teenagers. They make you go around them and then laugh about it.

What is wrong with those five scenarios?

The answer is quite simple. All of these people who have committed these acts have lost their sense of respect, courtesy and common sense. Something has gone wrong here. If we lose our respect for our fellow man and cannot be courteous to others, we are headed for chaos. Just a little common sense would tell us that we should treat others as we would like to be treated. You ask, "What does this have to do with amateur radio."

Do I need answer this? Just listen on the bands for a few days and you will see we have some amongst us who seem to have lost respect for others. They are uncourteous and don't listen before transmitting. If a group using one digital mode is congregating in a particular portion of a band, they drop in on them and use a different mode. Is this the way we should act? I don't think so. I realize we have a small amount of spectrum and must share but let's be realistic and try are best to respect each other. None of us want sub-bands established and if we work together as gentlemen that won't happen.

If there is anger inside us that has moved us to be hostile toward others, we must rid ourselves of such thoughts. Does our world seem more pugnacious causing us to be more combative towards others. If so, we should put this into perspective. A recent newspaper article related a statement made by a local person that the last 5000 years have been mostly peace and harmony. Though there have been wars and violence, in reality, history is only 10 percent violence. The other ninety percent has been good. Those are profound words and we should contemplate them seriously. Let us rid ourselves of all animosities and start the new year with a clean mind and do unto others as we would, they do unto us.

Why not make a new year's resolution now to be more respectful towards others from now on. Be courteous and think before acting. Listen carefully before transmitting. It really is okay to turn up the volume control a bit to see if someone is real close to your frequency. There is room for all of us if we use a little common sense when operating.

Maybe I sound like Big Brother but I am not. I am only putting down

(cont'd on page 13)

The Contest Chair

Hints, Tips & Inspiration for Better Scores

by Ron Stailey, AB5KD • 504 Dove Haven Dr • Round Rock, TX 78664
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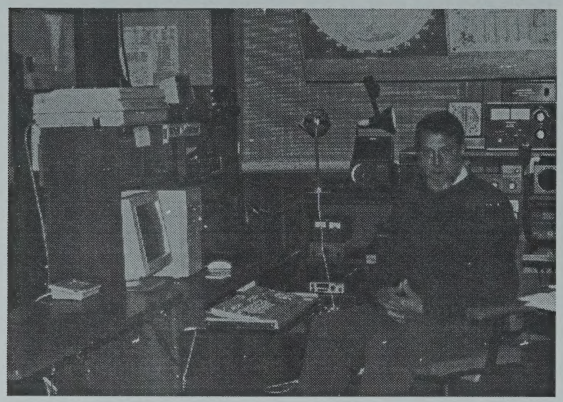


Hello Contesters and DX-ers! Happy New Year! Remember the Roundup is just around the corner. **Then comes the ADRS WW RTTY WPX Contest!** This one should be a biggie and I am sure you won't want to miss it. Better get in touch with Ray WF1B and get the WPX software upgrade. As for the contest, I just hope the packet racket people will show a little consideration! (God Bless them one and ALL).

This month we meet a contester that is in almost every one that comes along. Norman Gomm VK6GOM of Kalamunda Western Australia. Norm is one of those who travels a lot, or did when active in his profession. He is the Western Australian State Director of the Federal Department of Industry, Science and Technology. Wow, what a mouth full! Norm says it is the equivalent of the U.S. Department of Commerce. Posted twice to the Australian Embassy in Washington, he lived first in Virginia and then in Maryland. Norm calls the U.S. his second home. A member of the Army Reserve, he also did a tour of duty in that tropical paradise of South Vietnam, where he was attached to the U.S. Marine Corps for a couple of years.

Norm has operated in contests as VK1GN, W3/VK1GN and VK6GOM. He classifies himself as a "small gun." Until recently he operated barefoot into a 1/4 wave vertical,thus relying on operating skills rather than equipment. But now he has an acre of land in VK6 land, the first time he has room for an antenna farm.

He uses several combinations for the different modes. RTTY is his favorite and there he uses the Yaesu FT-757 and an Ameritron AL-80A amplifier—"No bells and whistles, just reliable RFI free, hard working power." Norm runs at about 3-400 watts which means the rig is loafing along well below rated maximums. The result—longer life and no meltdown in the middle of a contest.

While he operates as mostly Single Op these days, when Norm was operating as W3/VK1GN it was mostly Multi/single with his good friend Ron WD4KUI. These were fairly laid back affairs and sometimes operating techniques subordinated themselves to discussions about respective martini making skills, Army Vs Navy matters, etc. They didn't win many plaques then but they surely had a good time!

Some of Norm's awards are shown in the box. He claims the list is no big deal but, at the time it sure gave him a buzz. "ARRL and CQWW contest should follow the ANARTS and European format" says Norm and "treat VK and JA call areas as separate countries. After all, U.S. states and VE Provinces are counted that way so that stacks the deck in favor of the US/VE stations." He would also like to see some format that awards operating skill rather than tall towers, great sites, high power and mega-bucks.

BARTG	1988	First	VK1 area
ARRL	1990	Third	MD/DC area
CQWW	1990	Fifth	USA
ARRL	1992	First	MD/DC area
ANARTS	1993	First	VK6 area
BARTG	1993	First	VK6 area
JARTS	1993	Fifth	Oceania

Software. For contesting "RTTY by WF1B is absolutely tops. It's so good 1 often feel that I'm not pulling my own weight. 1 would sure like to see it expanded to cover other RTTY contests such as ANARTS and JARTS. (Note: new V2.1 2 has JARTS and WPX, and Ray says all contests will be added over time). He also uses Desqview, CompRTTY-II, AEA and MFJ's software.

Hardware. A 386DX33 packed with a PCI-3000, attached to a PK-232 and MFJ1278B (listed in order of preference) make up the hardware list. "Hal's PC1-3000 shines on RTTY and is rock solid even at low signal strengths. PK-232 is a good allrounder and the MFJ does give some extra modes. As for tuning, the only way to go is a crossed-hair display. It is miles ahead of the LED bars when it comes to contesting.

Tips, tricks and techniques. "No RFI keeps the neighbors happy!" He uses low pass filters on his rigs all of the time and has had no complaints about RFI, even where his station was close to the neighbors. One of his GSRVs passed with in five feet of a TV antenna with no interference even with high power. "A good ground rod and lavish use of toroids helps a bunch."

Bands. 20 meters is the workhorse. He does like 15 when its open, but with current conditions 20 meters is it. He usually tries to hang out around 14088-90." Anywhere above that the BLOODY packet racket people tend to crowd RTTY."
"I do a mix of calling CQ and hunt-and-pounce, but prefer the former." When he had a relatively weak signal he found that other stations responding to his CQ often alerted others nearby that they were working a VK. That's a bit like feeding barley to fish, or offering FREE beer to a Marine—it soon attracts attention.

Shack. "As She-Who-Must-Be-Obeyed didn't want all that nasty ham stuff cluttering up her nice house (and besides she didn't like all those cricket and frog noises), I was relegated to an outside building." He respectfully sought permission to have the building renovated and lined and now has a very nice roomy shack. Unfortunately, because it's so far from the house, it is difficult for him to hear calls for help with the dishes and other chores. Norms says, "It's a real worry!" Note: I know just how you feel, Norm. I worry about things like that myself, everyday! Contesting is a tough life but someone has GOT to do it... :-)

I would like to thank Norm for his info and pictures. I also wish him a very successful contest season. Next month we will visit Roger Ward—GW5NF and M/S efforts there.

Until next time, 73's de Ron. "Remember: big antennas high in the sky work better than little ones close to the ground."

BULLETIN

KB1PJ MBO/BBS CLOSING

Some of you are aware that I am changing jobs the first of January and have been arranging for the closedown of my mbo/bbs the end of the year. The time has come. I expect that the ham I helped to put on Aplink a few months ago WG1I will be picking up all the traffic including international.

I have been operating non-stop since the Armenian earthquake and cannot say that this is easy, but the difference between the fall of 1987 and the fall of 1994 is the vast number of stations out there to handle the traffic.

I expect close down to take place New year's eve assuming the alternative station site is running properly and all is ok.

73, David KB1PJ

THE 1ST ANNUAL ADRS WORLD-WIDE RTTY WPX CONTEST

FIRST FULL WEEKEND IN FEBRUARY EACH YEAR = FEBRUARY 4TH AND 5TH 1995

STARTS: 0000 UTC SATURDAY - ENDS: 2400 UTC SUNDAY

I. CONTEST PERIOD:
For Single Operator and Multi-Single only 30 hours of the 48 hour contest period are permitted. Off periods must be a minimum of 60 minutes in length and be clearly marked in the log. Multi-Multi operator stations may operate the full 48 hours.

II. OBJECTIVE:
The object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period using a digital mode. RTTY, Amtor, Pactor, G-tor(tm),and Clover (tm) modes are all encouraged.

III. BANDS:
The 3.5, 7, 14, 21, 28 MHZ bands may be used. No WARC bands.

IV. TYPES OF COMPETITION:
1. SINGLE OPERATOR (High Power All Band, Low Power All Band and a Single Band)
(a) Single operator stations are those at which one person performs all of the operating and logging functions.
(b) LOW POWER: Same as 1(a) except that output power shall not exceed 150 watts. Stations in this category will compete with other low-power stations only. (Only for an All Band Entry.)
(c) SINGLE BAND stations are high power only (even if low power used).

2. MULTI-Operator (All Band operation only) No power classes.
(a) SINGLE TRANSMITTER: Only one transmitter and one band permitted during the same time period (defined as 10 minutes).
(b) MULTI-TRANSMITTER: No limit to transmitters, but only one signal and running station allowed per band.

NOTE: All transmitters must be located within a 500 meter diameter or within property limits of the station licensee's address, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers.

DX PACKET CLUSTERS, AND DX ALERTING ASSISTANCE IS PERMITTED in all classes of operation.

V. EXCHANGE:
A RST report plus a progressive three-digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000.) Multi-transmitter stations may use separate numbers for each band.

VI. POINTS:
A. Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7, and 3.5 MHz.
B. Contacts between stations on the same continent but in different countries are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7, and 3.5 MHz.
C. Contacts between stations in the same country are worth one (1) point on 28, 21, and 14 MHz and two (2) points on 7, and 3.5 MHz.

VII. MULTIPLIER:
Multiplier is the number of different prefixes worked. A "PREFIX" is counted only once regardless of the number of times the same prefix is worked. No band multipliers.

A. The letter/number; combination which form the first part of the amateur call will be considered the prefix.

EXAMPLES: N8, W8, WD8, Y22, Y23, HG1, HG19, WB2, WD200, KC2, KC200, OE2, OE25,U3, GB75, ZS66, NG84.

Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable, the portable prefix must be an authorized prefix for the country or call area of operation. In case of portable operation, the portable designator would then become the prefix.

EXAMPLE: AB5KD operating from Wake Is. would sign AB5KD/KH9 or KH9/AB5KD, and KH6XXX operating from Ohio would not sign /KH8 which is normally assigned to American Samoa, but could sign /W8, /N8, /K8, etc., or any other prefix authorized for use in the U.S. 8th call district.

Portable designators without numbers will be assigned a zero (0) after the second letter of the designator to form the prefix. WS7I/PA would become PA0. All call without numbers will be assigned a zero (0) after the first two letters to form the prefix.

EXAMPLE: XEFTJW would count as XE0, RAEM would count as RA0, etc. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

B. Special event, commemorative, and other unique prefix stations are encouraged to participate.

VIII. SCORING:
1. SINGLE OPERATOR:
(a) All Band score: total QSO points from all bands multiplied by the number of different Prefixes worked.
(b) Single Band score: QSO points on the band multiplied by the number of different Prefixes worked. (See VII)
2. MULTI-OPERATOR stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.
3. A station may be worked once on each band for QSO point credit.

IX. LOW POWER SECTION: (Single Operator only)
Output must not exceed 150 watts. You must indicate Low Power on the Summary.

X. AWARDS:
Certificates will be awarded to the highest scoring station in each category listed under Section IV. of the rules.

1. In every participating country.
2. In each call area of the U.S., Canada, Australia, and Japan.
3. All scores will be published. However to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-Operator stations must show a minimum of 18 hours. Plaques will be awarded only to serious contest efforts. Decisions of the contest chair are final. A single log is eligible for a single award ONLY. If a log contains more than one band, it will be judged as an all band entry, unless specified otherwise.

See PLAQUE LIST.

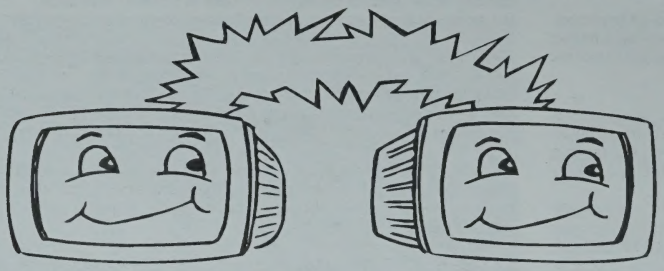
XII. LOG INSTRUCTIONS:
1. All times must be in UTC. All rests must be clearly marked. Single Operator logs must be submitted in chronological order. Multi-Multi logs must be submitted chronologically by band. Multi-Single can be submitted either way.
2. Prefix Multipliers should be entered only the first time they are contacted. They must be clearly designated.
3. Logs must be checked for duplicate contacts, correct points, and prefix multipliers. Duplicate contacts must be shown.
4. An alpha/numeric check list of claimed PREFIX multipliers must be submitted with your log. Unless disk or electronic entry.
5. Each entry must be accompanied by a Summary Sheet listing all scoring information,the category of competition, and the contestant's name and mailing address. May be electronic. Also submit a declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.
6. Official logs and sample summary sheets are available from ADRS. A large self-addressed envelope with sufficient postage or IRC's

(cont'd on page 15)

Computer LANS

In Digital Mode Ham Stations - Part II

by Paul Richter, W4ZB • PO Box 19190 • Washington, DC 20036-9190
CompuServe ID: 70743-3517



The first part of this article appearing in the Dec. 1994 Digital Journal showed that the use of a computer local area network ("LAN") arrangement within a single modern digital mode ham station could be used to link multiple PCs together. Such an arrangement offers many advantages and possibilities for maximizing the computer resources available to service the operating needs of the station in an efficient and cost effective manner.

In this installment, we explore all the aspects of hamshack LANs which differ from those used in the business environment.. We will then consider the various LAN components and technologies which are available today, and focus on those which are most likely to continue to be viable in the future. We will identify the essential elements for a hamshack LAN, the design choices and trade-offs involved. And then look briefly at what several other hams have already done in setting up hamshack LANs.

DIFFERENCES BETWEEN BUSINESS AND HAM STATION LANS'

Almost all of the many sources of technical details on setting up and operating PC based LANs are focused on business uses. This is understandable because that's where the users are. "Home" computer LANs are rare even in households with multiple computers, even though the operation of a peer-to-peer LAN in a digital mode ham station is a relatively simple undertaking. Let's look at the differences between business and ham shack LANS, a review that will make it easier for the LAN "novice" to find and extract pertinent technical information.

1. Number of computers on the LAN. Business uses often involve tens and sometimes hundreds or thousands of separate computers on a single LAN. It is difficult to image a ham station setup requiring as many as ten separate computers on a LAN. Fewer is simpler.

2. Physical distances on the LAN. Computers on a business LAN spread out over several thousand feet, sometimes several miles. In ham stations, all computers are usually within a single room or within several hundred feet of each other around the house. Shorter is better.

3. RFI and EMI environment. A ham station installation requires special attention to grounding and shielding to prevent interference from the LAN equipment. At the same time, the computer systems and LAN cabling used in your station must not be sensitive to interference from high strength RF sources. This sensitivity to RFI constrains the LAN cabling choices.

4. LAN type: peer-to-peer vs. dedicated file server. In a peer-to-peer network, each computer on the LAN is equal to all others, and may run application programs and share the resources on all computers on the LAN. A non-dedicated file server function may be used on such a network, but is not required. In a dedicated file server type network, certain types of files (e.g. accounting files, customer files) are on the server and may be accessed or modified by authorized users on the network. The dedicated file server only performs file server and network management functions. For ham station uses, a peer-to-peer network is completely satisfactory.

5. Security considerations. A wide range of LAN security issues are presented in any business setting in which the computers on the LAN contain sensitive business information or are critical to business operation. These security concerns are much easier to deal with in a ham station setting. Physical security considerations are the same as for the station radio equipment, transmission lines and antennas. Elaborate password procedures are not needed because usually only a small number of in-station users will be permitted to have access to the computers. If the ham station LAN is accessible remotely over a dial-up telephone line, simple password procedures provided in the remote control software are sufficient to prevent unauthorized access. If the computers on a ham station LAN may be accessed over an unencrypted (e.g. ham) radio link, on the other hand, then relatively complex user authentication (password) procedures are required to assure that there is no unauthorized remote use of the ham station or the resources on the LAN. How to do this effectively and legally will become a topic of great interest as more and more hams set up systems which allow access to computers over unencrypted ham radio links. The good news is that legal procedures to accomplish this can be implemented in software using relatively simple cryptographic techniques, but that is a topic for another day.

6. Cabling and Installation. The ham station LAN environment requires LAN cabling systems which are easy to install and maintain and which can be modified without undue difficulties. Experimentation is a basic aspect of ham radio, and most active hams are constantly modifying and improving their station setups. LAN setups and cabling in business environments are more likely to remain the same for a period of time, sometimes years or more.

7. Bridges, Repeaters and Gateways. These are terms which frequently appear in the literature relating to business LANS and refer to devices for connecting to or interconnecting LANS or separate segments of a given LAN. A "bridge" is a device for connecting one LAN to a WAN (a wide area network) or to another LAN and has virtually no use in current ham radio practice.
A "repeater" is used for partitioning a LAN into separate segments to allow for expansion. Ham station LANS are small enough that only a single segment is necessary. A "gateway" refers to device which permits a connection to a LAN in a manner consistent with current ham radio practice.

8. LAN Administration and documentation. Businesses with elaborate LAN setups need a resident LAN Administrator to make certain that everything connected to the LAN keeps working properly. In the much simpler ham station setting, the control operator or licensee himself must understand the basics of how the LAN works and provide all of these functions for himself (and his other users).

In either case it is important for the LAN operator to keep detailed documentation for the specific LAN set up which should include: how the LAN is set up and configured; all hardware on or connected to the LAN; the "names" assigned to specific computers on the LAN; the system and user passwords needed to access the LAN; specific hardware configuration and software set up information for each PC on the LAN; port types, addresses and IRQ lines used by the hardware devices in each PC on the LAN; and details for each cable element in the LAN. Even in a relatively simple LAN used in a ham station environment, there are too many details to try to remember in your head. Eventually, some hardware or software element will fail and need repair or replacement. Good documentation will allow quick troubleshooting and repair.

LAN PROTOCOLS AND ACCESS METHODS

A "protocol" is a set of rules and procedures for communication of data between digital

devices in a LAN setting. The one used determines the details of formatting, timing, sequencing, error detection and control without which a stream of incoming bits would make no sense to the receiving device. A practical computer LAN requires a series of distinct communications protocols.

It is important to understand that there is always a very large (potentially infinite) variety of possible "protocols" in any specific data communication setting. Communication system designers working in isolation from one another would necessarily reach different "protocol" designs in a given setting, for the same reason that no two software or hardware designers working separately on the same complex problem would write the same code or design exactly the same hardware to solve the problem.

We have a special interest in protocols which have become "standards", i.e. agreed to and implemented by many vendors, users and industry groups. Hardware and software used under standards usually costs less than that for proprietary protocols. If we are shrewd (and lucky) in our selection of software and hardware, we will be rewarded with having purchased hardware (and software) with a longer useful lifetime.

The lowest level of required communications protocol in a computer LAN relates to the access method for each PC on the LAN. Each has a hardware network adaptor device which connects the bus of the PC to the LAN cabling. The LAN cabling then connects the adaptor device in each PC to the network adaptor devices on each of the other PCs on the LAN (either directly or through intermediate devices). The LAN software must impiement a low level protocol capable of moving data through the network adaptor device over the LAN cabling to the network adaptor devices of all the other PCs on the LAN.

The LAN software also provides a user interface to the LAN which utilizes higher level protocols to "connect" each PC to the network adaptor device in all other computers. This portion of the LAN software must run concurrently with the operating system and application software running on each PC on the LAN.

A number of different type network adaptor devices are available and correspond to the different access methods used on the LAN. They are frequently referred to as network interface card ("NIC") devices. There are four basic types of NICs and all are available at modest cost.

1. The Ethernet access method is defined in IEEE Standard 802.3 and comprises a CSMA/CD ("Carrier-Sense Multiple Access with Collision Detection") access method which is available in several different forms. A basic "thin" Ethernet LAN uses 50 Ohm RG-58 cabling in a bus arrangement connected to the NICs in each computer through BNC style "T" connectors. A 50 Ohm resistive terminator is placed at each end of the bus. The baseband data transfer rate on a thin Ethernet LAN is 10 Mbs ("Megabits/second"). Hardware and related software is widely available at relatively low cost. Computers running different operating systems (Unix and Macintosh, for example) may be connected to the LAN as well. It is estimated that approximately 50% of the installed base of NICs use Ethernet.

2. The IBM Token Ring is another LAN access method (defined in IEEE Standard 802.5) uses a "token ring" passing method for determining computer access to the LAN. The baseband data transfer rate on an IBM Token Ring LAN is 4 Mbs or 16 Mbs depending upon the specific set up. IBM Token Ring NICs are commonly used on large business LANs. The hardware required for an IBM Token Ring LAN is more expensive, 150% to 200% more on the average. For this reason, and since there is no speed or other advantage relative to Ethernet, we will not further consider the IBM Token Ring.

3. Arcnet is a third access method which also uses a "token ring" passing approach for determining computer access to the LAN. Arcnet hardware is still in widespread use, but its baseband data transfer rate on the LAN is only 2.5 Mbs. Though less expensive than Ethernet we will not consider Arcnet because of its slower speed.

4. Fiber Distributed Data Interface ("FDDI") uses fiber optics with baseband data transfer rate of 100 Mbs (using optical signals over fiber optic cables connected to the NICs). Unfortunately, despite its RFI and EMI immunity and very high speed advantages, FDDI hardware is still very expensive, and fiber optic cabling requires special tools to install (or modify), making FDDI impractical for ham station use at present.

ETHERNET - NETWORK ADAPTOR DEVICES AND CABLING SYSTEMS

Ethernet is the access method of choice for a ham station LAN. Let's now consider how Ethernet works in more detail and examine its variations. Ethernet uses the CSMA/CD (Carrier-Sense Multiple Access with Collision Detection) approach for allowing each computer on the LAN access to the LAN itself for communications with all other computers. If this sounds somewhat familiar, it should be: the earliest experimenters with amateur packet radio in the late 1970s intentionally adopted protocol approaches for packet radio which emulated the CSMA/CD aspects of Ethernet. The main difference is that Ethernet communications occur at baseband over a cable to which a number of separate Ethernet transceivers are connected, while packet radio communications occur at RF over a radio channel being shared by a number of separate packet radio stations. Elements of CSMA/CD operation are embodied in the AX-25 packet radio protocol the standard for amateur packet radio.

Ethernet uses a packet approach. Each packet contains six distinct fields, five of which are of fixed length. The field containing "data" in an Ethernet packet has a variable length, and may be as long as 1500 bytes. Like an AX-25 packet, each Ethernet packet contains source and destination designator fields, and a CRC check field which is used at the receiver for detection of possible transmission errors. If a transmission error is detected, the receiver signals the transmitter to resend the entire packet until the packet has been received without errors. When a packet has been correctly received, the receiver sends an acknowledgment signal to the transmitter.

Every transceiver connected to the LAN cable can "hear" every packet transmission on the LAN. Although a transceiver is primarily concerned about its own packets, it hears all traffic and its transmission will be inhibited until the other packet being sent has been completed. This avoids "intentional" interference which would otherwise cause an error in packet transmission. When an inadvertent "collision" does occur (as it inevitably will), the collision is detected and a special message is "broadcast" to all Ethernet transceivers on the LAN barring further transmitting for an arbitrary, random period of time. This minimizes the likelihood of further collisions.

In practice, Ethernet works extremely well on lightly loaded networks, i.e. on networks where traffic is small in comparison to the system's potential. In such cases the apparent "slow downs" from collisions are virtually imperceptible to the user. Ham LANs cannot begin to utilize the 10 Mbs transfer rate available on the typical Ethernet system.

NICS AND THEIR AVAILABILITY

A potential new Ethernet user has a wide variety of choices. Plug in cards for ISA type PC slots are available in both 8-bit and 16-bit card types. **I recommend procuring and using only 16-bit cards** (unless you are using an XT or earlier computer which supports only 8-bit cards). The costs of these cards new ranges from $50 to $90.

Ethernet adapters come with a variety of cabling options. The "thin" Ethernet cabling with a BNC type connector for use with 50 Ohm RG-58 cable is most common. **I strongly recommend that for ham station uses.**

An alternate cabling system which uses an unshielded twisted pair cable with RJ-45 connectors and known as 10BaseT. This system requires the use of a one or more central wiring Hubs. The wiring Hub costs additional money and **the unshielded, twisted pair cable is not suitable for use in the ham shack** due to RFI and EMI considerations.

Ethernet cards also come with combination BNC and RJ-45 connectors on them so that the user may select which type of cabling system he wishes to use at the time of installation. These types of "combo" cards cost about 15% more than a single BNC or RJ-45 connector card. Some Ethernet cards also provide a 15 pin AUI connector which is required for a "thick" Ethernet cable. **"Thick" Ethernet cabling offers no advantages in a ham station** and will not be further considered.

Ethernet NIC cards are also available for PCI

(cont'd on page 13)

Basic Packet Radio

A review of a book by Joe Kasser, W3/G3ZCZ

Review by Wayne Renardson, NZ4W • 1113 Woodvale • Nashville, TN 37204

I have never forgotten my first experience with packet radio. During the summer of 1983 and I was visiting my wife's family in Port Gibson, Mississippi, a town of 600+ souls located in a part of the state known as tornado alley. I had taken my Century 21, a Vibroplex single-lever paddle, and a forty-meter dipole that let me operate CW from a small room in their home.

The amateurs in Mississippi take their radio hobby seriously since tornado destruction has a wonderful way of concentrating their minds on the importance of reliable communications. In addition to the Episcopal priest, Father Joe Chambers, KF5AT, the chief of police, Harvey Jones, KE5WO, was also active in weather and tornado alert networks on two meters. Father Chambers drove around in his old Buick, HF and VHF radios crammed into the front compartment with antennas jutting from the bumper like porcupine quills.

One night Chief Jones invited me over to his house. As we entered his shack I noticed the warm glow of LEDs and the cool resonance of the frequency readout on his TS-830. The two-meter radio was attached to a Terminal Node Controller (TNC) and a monitor, and as I approached the tube I saw messages flowing across the screen from all over the region. Harvey quietly fed the output to his printer, providing hard copy.

What amazed me was the silence. I work in an environment that handles emergency communications on a mixture of VHF and UHF voice radios. The noise level is profound. But here I found myself watching data silently drifting along the screen like a tumbleweed, LEDs syncopating their rhythmic blips with the received packets of information. Somehow, it was all very warm and peaceful compared to the din I was used to hearing. I was instantly amazed and impressed with the possibilities and potential of packet radio.

In his introduction to Basic Packet Radio, Joe Kasser, W3/G3ZCZ discusses how packet radio, starting with a few stations in 1980, altered the nature of amateur communications. Early packet stations connected to a local area network (LAN) had to operate in real-time. The only way station A could leave information for station B was for them both to be on-line simultaneously. But most amateurs did not operate their stations twenty-four hours a day, so amateurs took their clues from the telephone network and developed the ability to store and forward messages in Packet Bulletin Board Systems (PBBSs). It was the capability to upload and store for later retrieval that altered time. Communications no longer had to be in real time, and it is that fact that revolutionized the nature of message passing. Station A could now leave information for station B in the latter's favorite PBBS to be read at the recipient's leisure.

Kasser delves into another facet of time. Since packet radio shares the frequency with other stations, there must be a method to allocate the spectrum. Since not all stations are constantly transmitting packets, the unused time on the channel can be occupied by other stations. Time-sharing maximizes the use of spectrum by allowing the largest number of stations to use the least amount of bandwidth.

With many stations occupying the same frequency, there must be a method to determine what messages will be received by each station, and Kasser provides a clean explanation of the basis for packet identification and error detection, warning that packet radio guarantees every packet will be received error-free. It does not, however, guarantee that every packet will be received.

Using hand-drawn illustrations, Kasser takes the reader through the fundamentals of the network and the components that comprise a packet station from the PC through the antenna. A thorough discussion of the various TNC modes (KISS does indeed stand for Keep It Simple, Stupid) and such protocols as AX.25 and high-level data link (HLDL) round out his chapter on getting started in packet. When discussing the terminal software, Kaiser claims that:

...you will need a terminal program that transfers data between the keyboard and serial port on the PC. This program will be referred to as the Terminal Program because it is designed for your personal use, not for use as a PBBS.

The PC is called a personal computer because it was designed for personal use. A terminal program is named such because it runs on a DTE or PC known as Data Terminal Equipment, as we are told at the beginning of the chapter that explains how to connect the PC to the TNC.

In order to understand the relationship between the PC and TNC, Kasser covers the RS-232 signal assignments, baud rates, parity and stop bits, and other technical tidbits that explain the path between the computer and controller.

The Local Area Network (LAN) section discusses how TNCs communicate, how to control the display of packets, how to ignore packets, the wireless LAN, beacons, and target and alert calls. A chapter devoted to connecting covers different methods of linking, including via K-A Nodes, TheNet, and NET/ROM. Digipeating, using G8BPQ, MSYS, and PK-90 Nodes/Gateways are also explained, and there is a brief discussion of ROSE switches.

An entire section is devoted to an overview of the PBBS with an explanation of connecting, obtaining information about the system, reading and sending messages around the world, sending and forwarding bulletins, and additional information about the NTS message links. There is also an overview of the multi-user, multi-lingual, multi-capacity F6FBB PBBS.

The final, fascinating chapter of Kasser's book is an exploration of Transmission Control Protocol/Internet Protocol (TCP/IP), Wormholes, and the Internet. TCP/IP supports Mail, File Transfer Protocol (FTP), and TELNET functions. Mail provides message storage and forwarding, FTP handles file transfers (ASCII and Binary), and TELNET permits one station to remotely log-on to another station and operate it as a remote user.

TCP/IP assigns each user a particular domain number, and amateur radio has its own identifier, forty-four (44). But since most packet radio operates too slowly, and the packet protocol AX.25 is not TCP/IP compatible, there is little linkage between the packet radio users and the internet. To overcome this, some packet BBS gateways carry both TCP/IP and AX.25, providing real-time "wormholes" to other parts of the network.

Kasser discusses the Network Operating System (NOS) programmed by Phil Karn, KA9Q, and others, that makes the connection possible, and using numerous illustrations, shows actual screen shots of stations linking to the Jet Propulsion Laboratory computer, systems in Honolulu, Britain, Russia, Hungary, and elsewhere. A command reference set is supplied and the reader is carried through a typical connection from the packet radio system to the world of the internet via wormholes.

As a prognosticator, Kasser predicts that reliable real-time links will soon be available to packet radio users to anywhere in the world. Message forwarding on HF (listen up, HF MSO operators) or via OSCAR will disappear since packet radio operators will pass information directly to the receiving station. There will be no need to wait for a PACSATT to pass overhead or band conditions to improve on HF to make the necessary links.

Since anyone using packet radio will be able to log on to a station in Maine, then to one in Paris, and then to another in Moscow, it will be impossible to determine the true location of a station. Censorship will disappear, just as it has on the internet.

The remainder of Kasser's book, which is over half the volume, is a discussion of Lan-Link. Kasser is the author of the multi-menued program that is suitable for use with the TNC1, TNC2, KPC-2, PK-88, KAM, MFJ-1278, DSP-2232, PK-232 and PK-900

TNCs. Since I do not use Lan-Link and it was not provided with the book, the software will be reviewed in the future.

Kasser has written a valuable book. It is a thorough discussion of packet radio and covers material that goes beyond the basic knowledge implied by the title. It seems strange to offer a thick book (the pages are not numbered) that is more than 50% devoted to a particular piece of software, albeit written by the author. But if you are interested in Lan-Link, Kasser's book is the bible. As a minor note, there are also unnecessary commas in numerous sentences throughout the book. The text could stand editing. It contains a nice table of contents and nine pages of index. It is priced at $29.95 and available from Software For Amateur Radio, POB 3419, Silver Spring, MD 20918.

(Hits & Misses - cont'd from page 7)

on paper what is happening out there on the bands. It is the responsibility of us all to take control of our operating procedures and act more intelligently. Let's continue to have fun but with dignity. Let's get back on track.

Dayton 95

Last month I announced the room availability for the Hamvention. Again this month I remind you that if you plan to attend next April and want a room at the Radisson Inn then you must act now. Rooms are always at a premium at Dayton and once these room are gone, finding a room will be an impossible task.

The digital group stays at the Radisson and that is where all the action will be taking place. Forums, hospitality suite, digital dinner, just to name the official events scheduled for the hotel. The famous "Digital Digest" forum will be held on Saturday at the arena.

What else can I say that will convince you that this is the year for you to attend. There is so much for the digital person to do and see that it boggles the mind. The ADRS is going all out to bring you the best at Dayton. Call, FAX, write or leave word on Compuserve for me and I'll reserve a room for you at Dayton 95. You'll be glad you did. The phone/FAX number is (619) 728-3838 and my Compuserve number is 73074.435 (see Hotel Room Ad on page 28). My address is the same: 1904 Carolton Lane, Fallbrook, CA 92028-4614.

(Computer LANS - cont'd from page 11)

slots in current Pentium computers. These motherboards provide fewer ISA type slots so consider using a PCI slot for an Ethernet adaptor card to avoid using up an ISA slot. Ethernet cards for PCI slots are slightly more expensive than those for ISA slots.

Ethernet adapters are also available as plug in devices for the PC's parallel printer port. The cost ranges from $140 to about $210. They may be configured onto a LAN cable to permit the **temporary** connection of a laptop or other computer to the LAN when needed. The main disadvantage of this approach is that the effective speed of the LAN will slow down to the speed of the parallel port. But this disadvantage is overcome by the advantages of being able to connect to the LAN.

Ethernet adapters are also available as PCMCIA plug in cards for laptops and PCMCIA slot devices. Such PCMCIA cards now cost about $190 to $240. Ethernet and 14.4 modem PCMCIA cards have now been merged into one unit but are a bit expensive. The current listing shows a price of about $480.

For most ham stations, it is recommended that Ethernet cards (or PCMCIA cards for laptops so equipped) and "thin" cabling form the backbone of the system. In such a setup, the base of a BNC "T" connector is first connected to the BNC male connector on each Ethernet adaptor . A series of "thin" RG-58 coaxial cables (with a BNC female connector on each end) is then connected from BNC "T" connector to BNC "T" connector on each Ethernet adaptor on all computers on the LAN. This forms a (non-looping) bus arrangement. A 50 Ohm terminator plug is put onto the end of the unused BNC "T" connector at each end of the bus to minimize signal reflections on the transmission line defined by the LAN cabling. Ethernet permits a bus length of several hundred feet (or more) without special provision — which is more than adequate for ham station LAN operation.

Make certain that the adaptor manufacturer you select special software drivers required for the LAN software you propose to use. Although Ethernet adapters are essentially commodity products at this point, obscure problems requiring special software drivers can still arise, and it might be worth paying a small premium to know that you are dealing with a vendor who will provide support. This is particularly important if you are contemplating using obscure or non-standard LAN software. Keep in mind is that once you have your Ethernet adapters and cabling installed and working you can then easily change (or upgrade) your basic LAN software if and when it becomes desirable.

WHAT OTHERS HAVE DONE

The use of computer LANs in digital mode ham stations is not new, but as noted earlier, very little has been written about how to do it. Peter Schulze, TY1PS: "Right now I am running a private Clover MBO and have only one 486/66; 600 Meg HD; 16MB RAM. However, I used to have up to 4 PC's running on a hamshack LAN. The four computers were configured as follows: Main 386/33: disk server, ran Aplink MBO and Scanning software. Four serial ports were active: 1) HF Amtor (COM1), 2) HF Packet (40 meters regional access) (COM2), 3) VHF Packet (Link to Lagos & Lome) (COM3), and 4) software scanner for Amtor HF (COM4). Second 386/33: backup for main server, ran MBO while I used the first machine for other purposes. Two serial ports: HF-Amtor and Scanner. Third 386/25: satellite system (Pacsats, UOSATS), automated. Messages went into the HF MBO across the network automatically. XT: ran the tracking software for the Satellite antennas. This was a good use for the old XT and avoided any need to multitask on the Satellite machine. The ham shack LAN used Taiwanese NE1000 or NE2000 compatible 8/16 bit Ethernet adapters.Thin Ethernet works very well, is easy to install and never posed any shielding problems. System had a nondedicated server in the beginning, was peer-to-peer later."

Peter Detweiler, WA2MFY: "station includes two separate AMTOR/PACTOR HF transceivers; one CLOVER only HF transceiver, and VHF packet radio. Computers control the MBO, the scanners, and the ETO Alpha 87A amplifier. Computers control automatic capture and downloading of information from the VHF packet radio and from a dial up telephone line. Station uses three 386/33s and two 486/60 on a Novell Ver. 3.11 LAN. Use of the LAN provides a powerful tool to share traffic and information from a large number of terminal nodes, as all can be put in a common file available to all users."

Terry Fox, WB4JFI: "I now have 4-5 machines running Linux tied together with Linux TCP/IP networking. The other four machines are MS-DOS based, and are currently running an old version of KA9Q's net code. I am working on other, better solutions for the DOS boxes. The DOS boxes also have Windows for Workgroups, so they should be able to share the Ethernet cable with the TCP/IP without problems." This system may eventually have multiple RF packet radio ports on VHF and UHF; a landline BBS; landline access to the Internet, including UUCP; dial up landline access to all ports for authorized users; and access to the LAN from the packet radio ports for authorized users."

In the next and final installment, we discuss how to set up a peer-to-peer thin Ethernet LAN in your ham station using the Windows for Workgroups networking software, with the PCs on the LAN simultaneously running Windows and DOS applications. We will explain why we selected Windows for Workgroups networking software over several others considered, provide specific implementation notes and details, and some examples of advanced features that might interest you. We will also discuss how such a ham station LAN set up might be easily modified to add the TCP/IP protocol so that a computer running a Unix operating system might be added to the LAN.

Contesting

Coming Events and Awards

by Rich Lawton, N6GG • 14395 Bevers Way • Pioneer, CA 95666

RTTY/Digital Contests - Coming Events

Date:	Contest:
JAN 7-8 '95	ARRL RTTY Roundup (USA)
FEB 4-5	ADRS WW Digital WPX (USA) <<—NEW!
FEB 11-12	EA WW RTTY (Spanish)
FEB 18-19	DARC HF RTTY Part I (German)

— — REMINDERS: — —

ARRL RTTY Roundup (January '95) log entries must be postmarked no later than 30 days after the end of the contest (February 7, 1995). Mail entry to:

ARRL RTTY ROUNDUP
225 MAIN ST.
NEWINGTON, CT 06111

ADRS WW Digital WPX (February '95) log entries must be postmarked no later than 30 days after the end of the contest (March 7, 1995) Mail entry (logs or disk) to:

JAY TOWNSEND, WS7I
P.O. BOX 644
SPOKANE, WA 99210-0644
-or-
via Internet: jayt@comtch.iea.com

— — COMING UP: — —

ARRL RTTY ROUNDUP CONTEST
January 7-8, 1995
Sponsored by ARRL

CONTEST PERIOD: Starts at 1800 UTC Saturday and ends at 2400 UTC Sunday. Operate no more than 24 hours of this 30 hour period. Two rest periods (for a combined total of six hours) must be taken in two single blocks of time, clearly marked in the log.

BANDS: 80, 40, 20, 15, and 10M (five bands).

MODES: Baudot (RTTY), ASCII, AMTOR, or Packet (attended operation only).

OPERATOR CLASSES:
a) Single op, unassisted, all bands:
1) less than 150 watts output.
2) more than 150 watts output.
b) Multi op, single transmitter. Once station has begun operation on a given band, it must remain on that band for at least 10 minutes.

EXCHANGE: U.S. stations: RST and state. Canadian: RST and province. All others: RST and serial number, starting with 001. Both stations must receive and acknowledge complete exchange for QSO to count. Neither cross-band nor cross-mode QSOs are permitted. Packet QSOs through digipeaters or gateways are not permitted.

QSO POINTS: Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit, but not for additional multipliers.

MULTIPLIERS: Count only once (not once per band), each U.S. state (except KH6 and KL7), each VE province (plus VE8 and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The U.S. and Canada do not count as DXCC countries.

Canadian Multipliers:

Prefix....Province	Prefix....Province
VO1/VO2....NFLD/LAB	VE4.....MB
VE1.....NB	VE5.....SK
VE1.....NS	VE6.....AB
VE1/VY2....PEI	VE7.....BC
VE2.....PQ	VE8.....NWT
VE3.....ON	VY1.....YUKON

FINAL SCORE: Total number of QSOs times total multipliers.

AWARDS: Certificates will be awarded to: Top scoring low power and high power single operators and multi-op scorers in each ARRL/Canadian Section; Top low power and high power single operators and multi-op scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

LOGS and SUMMARY: Logs should contain the suggested standard format: BAND, MODE, DATE/TIME, ON/OFF TIMES, CALLSIGN, EXCHANGE SENT/RECEIVED, MULTIPLIERS (marked the first time worked). Entries with more than 200 QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). A Summary Sheet must show: claimed score tally, class of operation, your call, name and address. Multi-ops stations please include names and callsigns of all operators.

DEADLINE: Entries must be postmarked no later than 30 days after the end of the contest (February 7, 1995). Mail entry to:

ARRL RTTY ROUNDUP
225 Main St.
Newington, CT 06111

RECOMMENDED OPERATING FREQUENCIES(MHz):

3.580 to 3.620	14.070 to 14.095
7.040 — RTTY DX	21.070 to 21.090
7.080 to 7.100	28.070 to 28.150

COMMENTS: The Roundup is the most popular domestic contest. It's much like the SS contests on CW/SSB. To make a high score one must concentrate on high QSO rates and lots of CQing. There are no band multipliers, meaning that once you work Utah on 15M, you will not get another multiplier for working Utah on any other band. If maintaining a high rate is just not your thing, you can set yourself another goal: see if you can work all states or provinces in the 24 hour period. In past sessions, all states have had RTTY stations on the air. This goal is especially exciting when using contesting software, such as the the WF1B RTTY contest logging software. It automatically keeps track of states/provinces worked and always shows you on the receiving screen whether you need that particular station for a new multiplier.

The Roundup is one of the few RTTY contests that has a low power category. This means that there should be more activity, primarily on the high bands. (Low power stations have a harder time cutting through the D layer absorption and QRN (static) on the low bands.) Those operating low power RTTY should pay close attention to picking out a frequency to start CQing. On RTTY it is difficult to find a clear spot on a crowded band, and when running low power, you just get clobbered easier when you're a bit weaker. You can't always assume that everyone has sharp filters in their radios. And on the high bands you can't always hear stations within the skip distance of your QTH. Sending a "QRL? BK" is a good way to interrogate whether the frequency is in use, just as in CW and SSB. It really helps when skip distances are long. And it shouldn't upset anyone - unless the frequency IS in use, and the time between the "QRL?" and the CQ is less than one second!

AMERICAN DIGITAL RADIO SOCIETY
announces
The First Annual ADRS World-Wide Digital WPX Contest
On the first full weekend of February each year

Starts: 0000 UTC Saturday. Ends 2400 UTC Sunday
4-5 February, 1995

(Complete details begin on page 9 of this issue)

COMMENTS: Here's a brand new contest! It's patterned after the CQ WW CW/SSB WPX but with some subtle changes. And it comes on when conditions should be really hot. The same station may be worked on different bands for QSO points, but there are NO band mults. There are QSO point bonuses for low band operation. The simple exchange (RST + QSO number) provides a way to keep track of your competition by comparing your serial number to his. And the rules fit everyone.

Note all those trophies and plaques and certificates that will be awarded, too. PREPARE!!!

• - • - • CATCHING UP AND LOOKING AHEAD • - • - •

We're starting 1995 off with a BANG BANG! Two BIG contests just a month apart: namely, the ARRL Roundup and the new ADRS WW Digital WPX. MUF conditions will be at their best. Power leaks should be at their quietest. Christmas presents will have been hooked up and tested for TVI/RFI. Static on the low bands should be minimal.

The Roundup is our most popular domestic contest - great for RTTY WAS award - and the WW Digital WPX should be a real barn-burner for chasing DX. To avoid some negative surprises, be sure to check contest rules and your logsheets. Also, if you're using contest logging software, give it a test run to be certain it does its thing. Get on the air a few days before those big weekends and study all band conditions by having a few QSOs on each band. You might go so far as to ask for an honest report! But be diplomatic about it. Tell 'em your running QRP (say, 5 watts), just to get some sympathy. You might be called a fibber, but take that as a compliment! Actually, the best approach is to ask for a comparison report, comparing your sigs to others in your area.

The bottom line is to enjoy. Choose a reasonable goal and go for it. Achieving goals brings a satisfaction that adds to the shear joy of the whole endeavor.

HAPPY HOLIDAYS, EVERYONE!

73... See you in the pileups, Rich, N6GG

P.S.
Drop me a line with an idea to share,
Or, drop me a line with an item to air.
Drop me a line with anger to bare...
But don't drop ME... 'cause I care!

Have you checked your mailing label lately?
If the ***Last Issue 01/95*** appears next to your name, it means your **ADRS** membership, and subscription to the ***Digital Journal,*** expires with this issue.
To keep your membership, and all the latest digital news coming your way, just fill out the coupon on page 29 and mail it -- **Today!**

(ADRSWPX - cont'd from page 9)

must accompany your request. Contest software by WF1B will be available for the first contest, and will be considered adequate logging software for this contest.

7. Contest logs may be submitted on disk, E-mail, or Internet. Logs submitted on disk must contain all required information. (Time, Band, Call, RST, RST & NR Sent, RST & NR Recd, Multiplier, and QSO Points). Files must be in ASCII format and in chronological order for Single Operators and Multi-Single entrants. Multi-Multi entrants must submit logs chronological by band. A sorted multiplier file is also required. Only MS-DOS compatible disks will be accepted (either 5 1/4 or 3 1/2 inch). A SASE with QSL Card will get a reply that your log has been received.

XIII. Disqualification:
Violations of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, non-verifiable QSO's or multipliers will be deemed sufficient cause for disqualification. (In-correctly logged calls will be counted as non-verifiable contacts.) An entrant whose log is deemed by the Contest Committee to contain a large number of errors may be disqualified. The contest committee's decisions are final.

XIV. DEADLINE:
Entries must be postmarked no later than thirty (30) days after the end of the contest. The ADRS World Wide RTTY WPX Contest will always be on the First (1st) full weekend of February.

Mail Contest Entry and Logs or Disks to:
Jay Townsend, WS7I
Post Office Box 644, Spokane, WA 99210-0644 U.S.A.
Via Internet jayt@comtch.iea.com

For ADRS WPX Rules, Log forms or Information contact:
Ron Stailey, AB5KD
504 Dove Haven Dr., Round Rock, Tx. 78664-5926
Via Internet ron481@austin.relay.ucm.org

XI. TROPHIES, PLAQUES and DONORS:

Multi-Multi
WORLD ————Kantronics Inc.
N.AMERICA——John Troost, TG9VT Memorial (by W2JGR)
EUROPE————Eastern Washington Amateur Radio Group
ASIA————George Clausson, K7WUW
S.AMERICA——George Wesley, KB2VO

Multi-Single
WORLD————Advanced Electronics Applications, Inc.
USA————RTTY by WF1B
N.AMERICA——Phil Duff, NA4M
S.AMERICA——ADRS Directors Plaque
EUROPE————Jim Mortensen, N2HOS
ASIA————Ted Marks, W2FG

Single Operator, All Band (High Power)
WORLD————Ron Stailey, AB5KD
USA————Irv Hoff W6FFC Memorial (by WA7FAB)
N. AMERICA—Hal Communications, Corp.
S. AMERICA—Pat Cardozo, HH2PK
OCEANIA———Shido Takahashi, AH6JF
AFRICA————Euraf Communications, Benin
EUROPE————Bill Hellman, NA2M
ASIA————Jim Colville, WB7AVD

Single Operator, All Band (Low Power)
WORLD———— Rich Lawton, N6GG
USA———— Don Hill, AA5AU
N. AMERICA—Ron Hall, KP2N
S. AMERICA—Warren Sinsheimer, W2NRE
OCEANIA———Wayne Matlock, WA6VZI
AFRICA———John Lockhart,WA0VQR
EUROPE————Eddie Schneider, W6/G0AZT
ASIA————Hal Blegen, WA7EGA

Single Operator - Single Band
WORLD 10 MTR—Robert Chudek, K0RC
WORLD 15 MTR—Washington Educational Foundation (by WS7I)
WORLD 20 MTR—Les Bannon, WF5E
WORLD 40 MTR—Barry Kutner, W2UP
WORLD 80 MTR—Tom Arvo, WA8DXD

Kantronics: King of the Dual-Port TNCs

by Phil Anderson, WØXI

Kantronics Company, Inc. in Lawrence, Kansas has long been the innovative leader when it comes to dual-port terminal node controllers (TNCs), including the KAM and KAM Plus, Data Engine, KPC-4, and KPC-9612. These units are truly dual-ports in that they all support simultaneous operation of both ports, unlike "crowbar" units that simply switch between ports used one at a time. There are many exciting applications for dual-port equipment, and Kantronics has expanded the alternatives by providing several dual port units to meet a variety of customer needs.

The first two-port TNC to offer simultaneous operation of both ports was the Kantronics All Mode (KAM); this popular feature has, of course, been retained in the KAM Plus. With these two units, users may operate any HF mode and VHF packet at the same time. This feature is particularly useful for digital DXers who wish to operate a digital mode on HF while monitoring a DX tracking network on VHF or UHF packet. Operating in this convenient way requires a split-screen-capable software program such as Host Master II+, and Kantronics units support Host mode, enabling this process.

Kantronics Dual-Port Units

Unit	Port 1 packet	Port 2 packet
KPC-3	1200	–
KPC-4	1200	1200
Data Engine*	1200 9600 1200 9600	1200 1200 9600 9600
KPC-9612	1200	9600
KAM	HF modes	1200

* 19,200 baud on either port if used with Kantronics D4-10 transceiver

Following the KAM was the Kantronics Data Engine, which was the first simultaneously operating dual-port to support two 9600 baud ports. With the optional, no cost G8BPQ networking EPROM installed, this dual-port unit establishes a clean networking node. The firmware also supports the attachment of additional TNCs via the RS-232 port in multi-drop KISS mode. The Data Engine can also be configured for cross-speed networking or digipeating by installing a 1200 baud packet modem in one port and a 9600 in the other. If you desire dual-port 1200 baud operation, you can install two 1200 baud modems or use a KPC-4.

The latest dual-port, the KPC-9612, really fits nicely into today's emerging 9600 market. This TNC offers simultaneous 1200 and 9600 baud operation, enabling cross-speed digipeating and networking. In addition, if need be, users can operate 1200 now while awaiting 9600 baud activity in their areas.

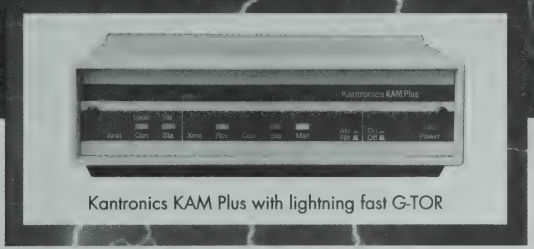
With the KNET optional EPROM installed, the KPC-9612 operates in full G8BPQ networking mode. And a real plus – the first of its kind – the KPC-9612 still operates as a TNC when the BPQ node EPROM is installed! And if the transceiver supports it, one radio can be cabled for 1200 and 9600 operation. For example, you can cable a Kenwood TM-251 for 9600 baud operation via the data jack and for 1200 baud operation via the mic input and speaker. With this configuration, packets of either speed on the dialed frequency will be received automatically, and the KPC-9612 will allow transmission on either port, one at a time.

With all these innovative TNCs, switching between ports is accomplished with a single keystroke when using a program such as Host Master II+. And even with a standard communications terminal program such as PROCOMM or TERMINAL (within the accessories window of WINDOWS), switching ports takes only two keystrokes. For example, if you are operating a KPC-9612 at 1200 and wish to switch to transmit on the 9600 port, you'd simply type the stream switch character and the letter 'a.' All packets sent after that go out the 9600 port.

In addition, monitoring both ports with these units is very easy; simply turn the Monitor command on. Packets received from port one will be labeled with a /1 while those from port two will be labeled /2. Some terminal programs that support the Kantronics Host mode may also split these monitored packets out onto separate windows. Simultaneous connects are possible too. While you are 'chatting' with a buddy on 1200 baud, another station or BBS may connect to your other port or may use it as a relay.

The future of dual-port TNCs looks bright. Perhaps some will be invented that are truly dual-mode like the KAM and KAM Plus mentioned above. Perhaps we'll see other dual-mode units that support new digital modes on one channel and packet on the other. For now, though, many fascinating alternatives exist – available only from an authorized Kantronics dealer.

Pactor is fast. G-TOR is more along these lines.



Kantronics KAM Plus with lightning fast G-TOR

The KAM Plus strikes again. It's now available with lightning fast G-TOR, a Kantronics innovation. More than twice the speed of Pactor in most band conditions, this error-correcting mode is the fastest HF mode available in a stand-alone TNC.

In addition to G-TOR, the KAM Plus operates the other popular modes and is capable of operating an HF mode and VHF packet at the same time. The KAM Plus also features more than 100K of personal mailbox space. And like most Kantronics products, the KAM Plus is small, portable and equipped with a NEWUSER command set and on-line helps.

KAM Plus with G-TOR. Together, the two are taking HF digital communications by storm.

Kantronics

For more information, contact your authorized Kantronics dealer or Kantronics at 1202 E. 23rd St., Lawrence, KS 66046-5006 913-842-7745 FAX 913-842-2021.

DX News

The latest digi-doings from around the globe

by Jules Freundlich, W2JGR • 825 Summit Ave., Apt. 1401 • Minneapolis, MN 55403

Yemen and Heard Island head the Digital Needed DXCC Countries List.

It is no surprise that the results of the 1994 Digital Journal Needed DXCC Countries Survey show that the most needed countries on digital modes are those which have not been active for several years, or have not been active within recent memory.

According to our survey, there are 15 countries in the top ten ranks that constitute the "most needed". See listing below.

All respondents reported needing 7O, Yemen, and VK0, Heard Island, thus ranking them both as "the most most needed." Running a close second is TN, Congo, followed by a tie for third place of 5A, Libya, and ZL8, Kermadec.

A5, Bhutan, and FT8X, Kerguelen are tied for fourth place, with VP8, South Shetlands in fifth place, followed by 3V, Tunisia in sixth place.

FT8W, Crozet, surprisingly, is in seventh place, followed by EP, Iran, in eighth place. 3C0, Pagalu, shares ninth place with SV/A, Mount Athos. Rounding out the "most needed" are PY/0, St. Peter and Paul Rocks, and YK, Syria.

Although Jean-Jacques, J28JJ, who visits Yemen frequently on business, has been attempting to obtain permission to operate from Yemen, the civil conflict in that country probably precludes an operation from occurring in the near future.

The sanctuary status of Heard Island, as well as the expense of reaching that place, make an expedition there soon of low probability.

There has been no sign of any impending RTTY operation from Congo. Operation from Libya in any mode is highly unlikely in the near future. Kermadec would seem ripe for an enterprising DXpediton...probably the biggest deterrent being the lack of financial support, such as was experienced recently by Ron, ZL1AMO.

If Jim Smith's efforts in Bhutan should materialize beyond limited demonstrations, we can expect that one eventually to move down the list.

Kerguelen was on RTTY, briefly, during 1994. We thought one of the resident scientists would continue operating, but there has been no RTTY activity reported from there in many months.

The upcoming RTTY operation from South Shetlands, with RTTY gear furnished by the International RTTY DX Association (IRDXA), should go a long way toward satisfying the demand for this one.

Permission to operate from Tunisia appears to lie in the hands of the military. In the past only foreigners were granted licenses. I recall that some Italian hams did operate from there several years ago.

Crozet remains an elusive one on RTTY for many. There have been no "regulars" out of Iran since the Shah was deposed several years ago, but licensing apparently is not completely out of the question.

There has been no operation from Pagalu, as best as I can recall, since 1986. At that time it was activated by an enterprising group, the Association Gabonaise des Radio-Amateurs. It looks as if the time is right for another venture by them.

With Mount Athos again back on the air, although sporadically, that country will undoubtedly gradually slip out of the "most needed" category.

The recent expedition to St. Peter and Paul Rocks by Karl, PS7KM, unfortunately did not include RTTY, so this country will continue to be wanted by many for some time. Finally, rounding out the ranks of the "top ten", the November 1994 Syria operation by YK0A will surely lessen the demand for that one.

Survey Results

(needed by 35% or more)

RANK	PREFIX	COUNTRY	% NEED (rounded)
1	7O	Yemen	100
1	VK0	Heard I.	100
2	TN	Congo	98
3	5A	Libya	96
3	ZL8	Kermadec I.	96
4	A5	Bhutan	92
4	FT8X	Kerguelen I.	92
5	VP8	S. Shetland Is.	90
6	3V	Tunisia	85
7	FT8W	Crozet I.	83
8	EP	Iran	81
9	3C0	Pagalu I.	79
9	SV/A	Mt. Athos	79
10	PY0	St. Peter/Paul	77
10	YK	Syria	77
11	9N	Nepal	73
11	VK0	Macquarie I.	73
12	ZL9	Auck/Campbell I	71
13	VU	Andaman/Nicobar	69
14	3Y	Bouvet	67
15	3DA	Swaziland	65
15	PY0	Trinidade/MVaz	65
16	T31	Cent. Kiribati	60
16	VU	Laccadive Is.	60
16	ZS8	Pr.Edw/Marion I	60
17	A6	Un. Arab Emir.	58
17	A7	Qatar	58
17	VP8	So. Georgia I.	58
17	XU	Kampuchea	58
17	YA	Afghanistan	58
18	3W	Vietnam	56
18	FR/T	Tromelin I.	56
18	JX	Jan Mayen	56
19	1S	Spratly I.	54
19	3A	Monaco	54
19	3D2	Conway Reef	54
19	9X	Rwanda	54
19	OJ	Market Reef	54
19	TI9	Cocos I.	54
19	VK9	Cocos Keeling	54
20	3D2	Rotuma I.	52
20	FT8Z	Amst/St.Paul I.	52
20	S0	Western Sahara	52
20	TT	Chad	52
20	ZK3	Tokelau I.	52
21	FH	Mayotte	50
21	KH4	Midway I.	50
21	ST	Sudan	50
21	ST0	Southern Sudan	50
21	XW	Laos	50
21	XY	Myanmar	50
22	3B6,7	Agalega/St.Bran.	48
22	CE0	Easter I.	48
22	CY0	Sable I.	48
22	VP8	So. Sandwich Is	48
22	ZD9	Trist. de Cunh.	48
23	1A0	S.M.O.Malta	46
23	3B9	Rodriquez I.	46
23	8Q	Maldives.	46
23	8R	Guyana	46
23	9U	Burundi	46
23	FR/G	Glorioso I.	46
23	JD1	Min. Torishima	46
23	KH5K	Kingman Reef	46
23	VK9L	Lord Howe I.	46
23	VK9W	Willis I.	46
24	7T-7Y	Algeria	44
24	HK0	Malpelo I.	44
24	KH5	Palmyra	44
24	S2	Bangladesh	44
24	T33	Banaba I.	44
24	ZL7	Chatham I.	44
25	3X	Guinea	42
25	A9	Bahrein	42
25	D4	Cape Verde I.	42
25	EK,UG	Armenia	42
25	J5	Guinea-Bissau	42
25	JY	Jordan	42
25	KH0	Mariana Is.	42
25	VK9N	Norfolk I.	42
25	YI	Iraq	42
25	ZK2	Niue	42
26	4P-4S	Sri Lanka	40
26	5T	Mauritania	40
26	9Q-9T	Zaire	40
26	EL	Liberia	40
26	FW	Wallis/Futuna I.	40
26	GD,GT	Isle of Man	40
26	KC4	Antarctica	40
26	PY0	Fern. de Noron.	40
26	S7	Seychelles	40
26	T2	Tuvalu	40

26	TL	Central Africa	40
27	4J-4K	Azerbaijan	38
27	FK	New Caledonia	38
27	KH8	American Samoa	38
27	T9,4N4	Bosnia-Herzeg.	38
27	VK9X	Christmas I.	38
27	ZB2	Gibralter	38
28	4J1	Malyj Vysotskij	35
28	C5	The Gambia	35
28	CE0Z	Juan Fernandez	35
28	D6	Comoros	35
28	ET	Ethiopia	35
28	EY,UJ	Tajikistan	35
28	FR/J,E	Juan de Nova/Eu	35
28	KP5	Desecheo I.	35
28	TJ	Cameroon	35

(Listing will be continued next month)

There were a total of 45 rankings covering all the current DXCC countries. Rank number 45, shows four prefix/countries not needed by any of the respondents. They are JA, W, VE and interestingly, VP5. (How about that Jody?)

A larger number of respondents would have allowed fine tuning of the data, such as determining the variation of needs by geographical area. There was a good mixture, however, of low and high country counts. The results were skewed by lack of representation from many areas. As limited as were the number of responses, the survey, nevertheless, is of interest. It is probably true that a larger number of responses would cause the exact need percentages to change, but chances are that, in general, the order of ranking would pretty much be similar. If you are looking for a place to go for a RTTY DXpedition, the results of the survey can assist you in making your decision.

Our thanks go to the following, whose inputs determined the survey results: CT1AUR, EA6NB, JF1MGI, KL7TF, RK9CWA, SM5FUG, K2ENT, KB2HK, W2FG, WB2CJL, WB2GOK, N3IHS, N3KK, N3UN, AA4M, KI4MI, W4PK, WA4MCZ, WB4UBD, AA5AU, AB5KD, K5KR, KA5CQJ, KE5PO, N5GGO, W5ZPA, WF5E, K6WZ, KD6TO, KE6XJ, KJ6BN, W6JOX, W6PQS, WA6VZI, WB6AFJ, WD6L, W6/G0AZT, K7DSR, K7NTW, KG7YQ, NJ7H, W8SEY, WA9AKT, K0RC, N0ISL, NJ0M, WA0PUJ, W2JGR.
Extra thanks to Bob, K0RC whose computer expertise enabled sorting of the data, and analysis of the results.

DX DOINGS

(Signals are 45.5 Baud RTTY unless noted.)

Note that the DX Doings below include activity as reported from world-wide sources. Therefore, some stations may not be seen, in your particular part of the world, at the hours indicated. To make best use of the data given, couple it with your knowledge of propagation paths to your QTH. For help in this regard, see the monthly propagation charts in QST, and listen to the hourly propagation forecasts at 18 minutes past each hour on WWV. Good luck!

ARGENTINA, AZ - Prefix hunters will likely find AZ7FAF on 20 meters around 2230Z.

ASIATIC RUSSIA, UA9 - If you are looking for Zone 18 on 40 meters, look for UA9UCO between 1800Z and 0130Z on 7036.5 khz. +/- QRM.

CAMEROON, TJ - Michel, TJ1MR, may be found around 1900Z on 14089 khz, unless he is obliterated by the 1200 baud foreign packet station on that frequency. QSL via F6FNU.

CAPE VERDE, D4 - After a lapse of some months, it is good to see this African island back on RTTY. Look for D4CAG on 20 meters around 0800Z. QSL route is needed.

CEUTA and MELILLA, EA9 - EA9AN operates 20 meters around 1600Z. QSL to Box 698, Melilla, via Spain.

CHAGOS I., VQ9 - If you don't have this one in the log yet, look for Jason, VQ9JB on 20 meters around 1440Z. Jason is in the U.S. military. He is from Washington state, and is newly licensed. QSL via PSC 466 Box 15, FPO AP 96464-0015. On Pactor, look for VQ9KC on 14069 khz around 1445Z. QSL via AA7AN, 93CBA or later.

CORSICA, TK - TK5MH can generally be found on 20 meters between 1430Z and 1630Z. QSL route is needed.

DJIBOUTI, J2 - Jean, J28JJ, is a regular on 20 meters. Listen for him around 1530Z (and around 0700Z). He is sometimes QRM'd by the 1200 baud foreign packet station on 14088.5/14090 khz. QSL via his manager, F6HGO, instead of direct to his Djibouti address, previously given.

FALKLAND ISLANDS, VP8 - Stuart, VP8CQH is another addition to the Port Stanley group. His home call is G0DVF. He can be QSL'd via G0DVF, CBA or direct, or if you like Falkland stamps, QSL, with appropriate enclosure, to Stuart Wadsley, BFBS/SSVD, RAF MPZ, BFPO 655, Falkland Islands, via U.K. Look for him on 20 meters around 2230-0130Z.

FAROE Is., OY - Caen, OY1CT can sometimes be found on 20 meters between 1400Z and 1500ZZ. QSL to his CBA.

IRAQ, YI - Ali, who has been one of the regulars at YI1BGD, since that club station first came on the air, has been sporting his own callsign, YI1AL, for some time. He operates 20 meters between about 1330Z and 1700Z. QSL, with IRC's to P.O. Box 140, Swelh, Jordan.

KOREA, HL - If you work HL9KL on 15 meters around 1630Z, QSL to KA3VKV.

KUWAIT, 9K - For those still needing this Gulf country, there is plenty to choose from. 9K2IC, 9K2HN, and 9K2WA are all active on 20 meters as early as 0700Z up until propagation fails. QSL 9K2IC to DG2SBW, 9K2HN to Michel Harmoniaux, HH2HM, BP 104, Ploubalay F-22650, France, and 9K2WA to P.O. Box 25020, Safat 13111, Kuwait.

MACAO, XX9 - For XX9KA try 15 meters around 1615Z. QSL to KC9V.

MADAGASCAR, 5R - New Pactor activity includes 5R8DS operating on 14069 khz around 1400Z. You may also find him on 20 meter RTTY around 1800Z. QSL to Box 404, Tananarive, Madagascar.

MALAWI, 7Q - Both 7Q7JA and 7Q7JL continue to be active on Pactor, favoring 14069 khz. They recently have been operating early in the UTC day, between 0430Z and 1030Z. QSL both stations to G0IAS.

MALI, TZ - TZ6FIC operates on 20 meters around 1930Z. You may also find him on Pactor around that same time on 14070 khz. QSL to FF6KEQ/F6KEQ.

MAURITANIA, 5T5 - Mohamed, 5T5MS likes to handle the pileups by taking his own list of approximately ten stations on 20 meters. He generally operates between 1600Z and 2100Z. Look also between 1300Z and 1400Z on 15 meters. For QSL route see DJ, November 1994, p.21.

MEXICO, XE - Nellie, XE1CI, takes time out from her DXpeditioning to operate RTTY on 20 meters around 1300Z.

MONTSERRAT , VP2M - A team of Woodbridge Wireless (VA) members and others will be operating 160-6 meters, CW/RTTY, from Montserrat before and after the ARRL DX phone contest, between 1 and 6 March 1995. Contest call will be VP2MFM. Operators will be WB4NFS, WD4KXB, KJ4VG, KA4RRU, KO4FM, WA4PGM, W2HPF, and W4MYA. All QSLs go via WD4KXB.

MOUNT ATHOS, SV/A - Monk Apollo, SV2ASP/A has proven to be a prompt QSLer. Use the direct address given in the DJ, October 1994, p.11. Recent activity has been on 20 meters between 1230Z and 1430Z.

PERU, OA - OA4CK beacons at about one minute intervals on 14070 khz. - "G-TOR, AMTOR, PACTOR BBS". This practice which was once prevalent in the RTTY slots, but which has not been seen for several years there, seems to have caught up with the "more advanced modes". We trust that OA4CK is listening prior to transmitting.

QATAR, A7 - Chris, A71EY continues to be active on 20 meters as early as 1215Z. QSL to Box 2260, Doha, Qatar, U.A.E.

RWANDA, 9X - It is surprising to see amateur operation again from this war-torn country. You may find 9X5EE on 20 meters around 2200Z. He also operates CW. QSL to PA3DLM.

TAIWAN, BV - BV7WB works 20 meters between 1530Z and 1430Z.
QSL route is needed.

UGANDA, 5X - Eugen, 5X4B, is active on Pactor. He likes 21069 khz., and operates around 0730Z to 0930Z. and around 1100Z when he may also go to RTTY. Eugen (formerly DL8AAI, 5Z4FU) and his XYL Sandra, 5X4A will be active at least for the next year from Kitgum in northern Uganda. They are the first and only hams in that area. QSL via DL8AAM, Thomas M. Roesner, Narzissenweg 11, D-37081, Goettingen, Germany.

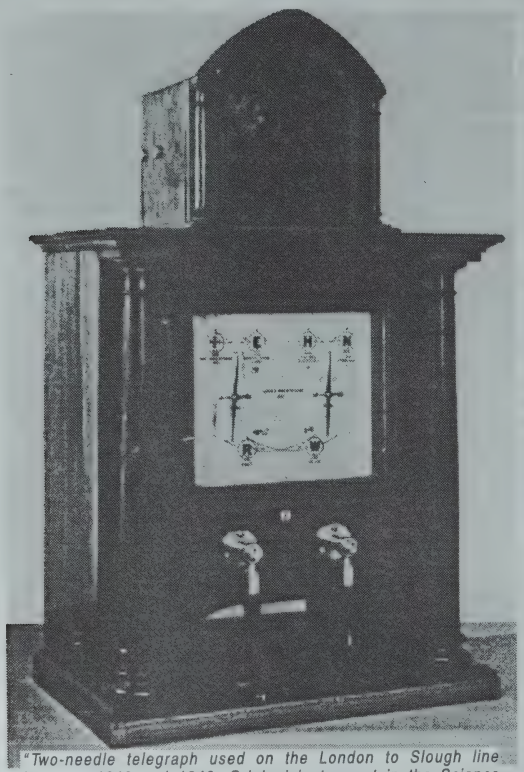
(cont'd on page 26)

A Bit O' History

A Wireless Printing Telegraph

by Crawford MacKeand, WA3ZKZ

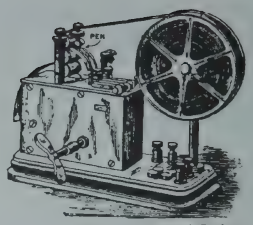
115 South Spring Valley Road • Wilmington, DE 19807



"Two-needle telegraph used on the London to Slough line between 1843 and 1849. Original instrument in the Science Museum, South Kensington"

Our radio rag-chews often need a helping hand, and even with help, we often bemoan the stereotyped QSO, the one that no matter how we try to get started, it fizzles out after an exchange of QSL data and a station description. One helper that I often used a few years ago, was to ask "How did you first get to be interested in RTTY ?" Today, when the gear is commonplace and relatively inexpensive, the question tends to fall somewhat flat, but twenty years ago it used to provoke a wide range of conversation starting answers. After all, surely not too many hams really wanted a great noisy mechanical monster sitting in the shack. None of the other equipment needed to be oiled, none of the others had the whirligigs, cams, springs and knuckle-busters that any TTY machine could offer. So how did these two diverse interests come together? There were as many different answers as you could shake a stick at, but for my part, I always stoutly maintained that I got into ham radio via RTTY, instead of the normal vice-versa. So, from this upside down perspective I am going to try and describe what was of interest to me back then (whenever back then may be), and pull together the two threads of printing telegraphy (or TTY) and ham radio.

Since I only grew up once, my interests in radio and in TTY (as I shall call printing telegraphy, which is much too long winded) grew up separately at the same time, and only came together quite late in the story. The telegraph bit starts first, because that's what I knew about first. Probably my original introduction was from a how-to-make-it article in some long forgotten boy's book or magazine, but I think that the deepest impression came from the railways. I grew up in a railway town in the North of England, and by great good luck the North Eastern Railway had collected much of its old equipment and safeguarded it for future generations. For the price of one penny, I could visit the Railway Museum, and look at and under and climb on and in

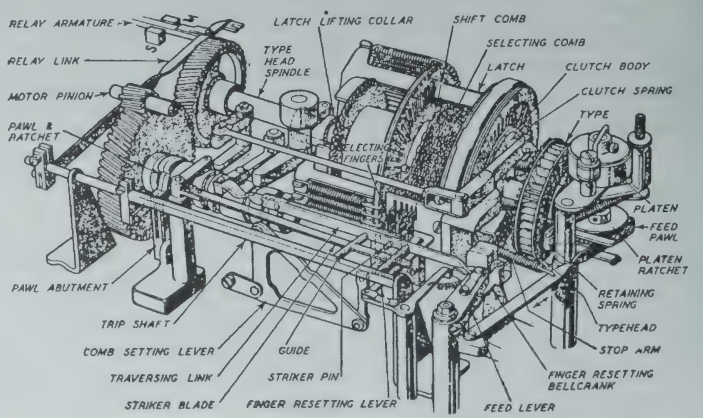


Recording Telegraph Register.

"I like the idea of winding this thing up"

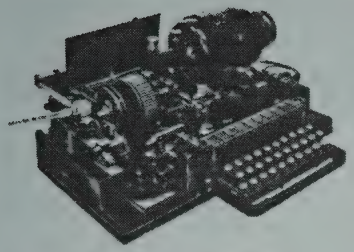
wonderful old steam locomotives and all the other exciting things that lived in the retired locomotive shed where they all lived in honest superannuation. But unknown to most, about half a mile away there was a branch of the museum which housed the more delicate elements of the collection. Papers and books and pictures, which were all very well, but not too fascinating, but also old telegraph equipment, five needle and six needle telegraphs, and ABC printing telegraphs, tape printers and page printers, relays and sounders, keys and cables, wires and insulators, you name it. And even better, entry as I remember to this annex was free, which was much better than a penny if I was broke. So when I started to play with my primitive home-made buzzers and keys, I had visions of much more interesting devices. And also, quite early I discovered that while I was in love with telegraphy, I had no great love or aptitude for Morse code. I must have been in the mid teens when I produced a wonderful paper design for a Morse decoder to be based on the telephone relays that were then starting to appear on the surplus market, for WW2 in Europe was just winding down. Thank goodness my meager pocket money would not stretch to building it; a few years later I found out how difficult the design of fast relay logic circuits really is! But this was the first of a few portents of a lifelong interest.

At about the same time I was also first inter-



Teleprinter No. 3: Receiver.

"A view of the innards of my Creed TTY from England"



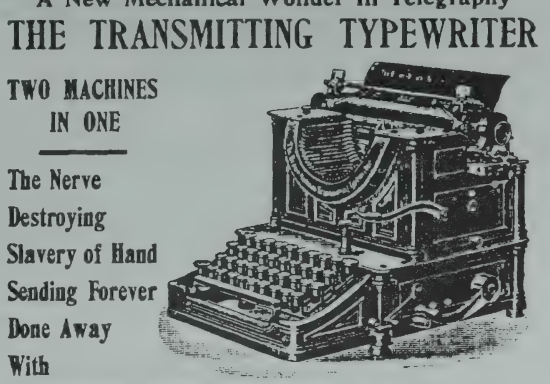
The Creed model 3 tape teleprinter

"The machine I owned in England"

ested in radio. My Dad and I built crystal broadcast receivers, but the real breakthrough came when my aunt gave me an old two tube set to do what I wanted with. The medium wave coils soon found a new home and were supplanted by a set of new plug-in short wave coils. I suspect that it never worked at all above about 10 MHz (or thirty meters as I would have called it then), but it did work at forty meters and I heard my first ham. G2AND whoever he may have been, calling CQ on AM phone, and in my memory not getting an answer. Though I may not have recognized it then, I was hooked. My parents did try quite hard to discourage me from getting too interested in a minor technology which was not a bit likely to lead to anything, but there were magazines like Practical Wireless, and when I was a little more affluent, Wireless World, which held and enlarged the interest. Dad was a chemist, but I had soon decided that a degree in Chemistry was not my idea of fun, and so I jumped in head-first and cancelled my draft deferment. Soon I found myself in an Army Radar training batallion. By great good luck, and as one of three who had some previous idea of what a tube (we called them valves) was for, I spent my service as an NCO instructor along with Mac G3ETZ, and so the seed was watered and our jointly constructed station G3ETZ/A kept everything alive, even to the extent of my passing the ham radio examinations.

But college followed the draft, and left no time for ham radio at all. And yet, one summer I was lucky enough to land a summer job with the British Post Office. They paid well for summer trainees if you gave them some written indication that you intended to join the telecommunication industry on graduation, and that didn't sound like a bad idea at all. But you can see where this slippery slope was leading, when I tell you that two of those ten weeks were spent with the Inland Telegraph service, surrounded by teleprinters. We had mainly Creed machines, No. 3 tape printers, and No. 7 page printers, and of course all the tape punches and tape readers that you could ever have wanted. Somehow or other this all stuck with me much closer than the then brand new microwave TV relay backbone, which I spent some days on. And so eventually I graduated and joined a telecommunication manufacturer as an apprentice. And what do you know, but one delightful month was spent as a dogsbody in a lab deep in rural England where the latest in radio teleprinting was under development. It's quite difficult to recollect now that in the 50's the stability of radio transmitters and receivers was not so good that narrow shift was easy to use. My temporary boss, Mr. Terlecki, had a patent for something called PCFS (pilot carrier frequency shift) which overcame the problem, (using a shift of about 50 Hz) and we had a radio link from the lab to a remote site half across the country and back on a different frequency. He delighted in demonstrating his system on frequencies which no commercial operator would ever have chosen, too low or too high for the propagation conditions, and for those days it was very good. Selective fading, the bugbear of 850 cycle shift, was no longer a problem. But a permanent berth came only a few months later when I joined the company's telephone cable contracting subsidiary, quite remote from either TTY or ham radio. Or it would have been except that my boss was Ralph G2HCJ, then a keen ham, and now a keen ham (GW2HCJ). One of my first acts was to spend five pounds on a war surplus TTY, a Creed Model 3X, to find out what made it tick. The idea of combining my interest with ham radio started to come alive.

The 3X was something else, but I soon had it hooked up on a local loop. Typing on the military 3X or any other Model 3 was a little of an acquired art, as it had the curious bug (in keeping with today's software terminology, maybe it should be a feature!) that it only printed the character you had just typed when you entered the next character. You want to type THE. Press the T. The machinery roars, clicks and rumbles and a big fat nothing happens. You wonder what is wrong. Press H, more clicks rattles and rumbles, and it prints T. Ha, at least something is happening. Press E and an H appears on the paper tape. Now another puzzle. Two space bars. The one on the left says "FIGURES" and the one on the right says "LETTERS". Choose the Letters one and it prints E. Enough of the idiosyncrasies of this fun machine, but it was surely different. By now I was looking for parts for a tone converter. Thanks to Terlecki, I knew enough about RTTY to make a start, but, as these things do, it all came to a shuddering halt. I had a field job and was rarely at home so progress was abysmally slow. And in 1957, I was told that my next job would be in Venezuela. My parents had put up with the total loss of one room of their small house for far too long, so at very short notice I sold almost everything, and departed for South America.



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"An early advertisement"

A couple of years later, I headed home, now happily married and soon to realize that the nomadic existence of a field telephone cable contract engineer, six months here, eight months there, was not the way we now wanted to live. So I changed industries, and eventually continents too, moving to the USA in 1968. By now I was almost completely away from communications, both ham radio and telegraphy. But a chance purchase of QST with a seminal article on the construction of the ST-3 RTTY converter blew so hard on the embers of my interest, that by March 1972, I was both G4ARR and WA2ZVX. And I was on twenty meters 850 cycle shift from deepest New Jersey with 45 baud RTTY and a Lorenz LO19 TTY machine.

TECHNOLOGY UPDATE

MICROSOFT INTRODUCES "WINDOWS 95"

Software giant Microsoft did what everyone expected they would. They introduced "Windows 95" at the Comdex/Fall '94 show held in Las Vegas. That convention drew some 200,000 people.

And if you thought the introduction of Windows 3.1 was big, just wait for Windows 95. A new global branding campaign will feature massive television, print, direct mail and in-store promotions. Windows 95 is expected to hit the stores in the first half of next year. Most industry analysts agree, however, that Windows 95 will not overtake sales of Windows 3.1 until 1996.

Microsoft will not only offer Win-95 at a low price, but will be quick to market several application programs (like word processing) that take full advantage of the power of their new operating system. Microsoft has a big advantage. They know what's coming. Competitors have yet study Windows 95. The bottom line is you can expect Microsoft which accounted for 38% of all application program sales this year - to extend their lead in the lucrative applications market even further. Software developers are already screaming 'unfair competition."

Observers note that the new product does not look much different from the existing Windows. Many buyers will wait to see how it goes ...and to be sure that Windows 95 is a bug-free product.

The Microsoft Network

And as predicted here, Microsoft is bundling a free subscription to it's new online service — now officially called "The Microsoft Network" — with its updated operating system. At least 30 million copies of Windows 95 is expected to be sold. That means 30 million people get entry into the Microsoft Network. That's fifteen times greater than the largest consumer online service operating today!

Microsoft's merchandising strategy has caught the attention of online market leaders, Prodigy, America Online and CompuServe. They believe Microsoft is using "anti-competitive practices" to gain entry into "their" market. Microsoft is already under anti-trust investigation. The justice dept.. is looking into whether their acquisition of Intuit and their popular Quicken program constitutes a monopoly. (Quicken owns about 80% of the home finance software market.) It now appears that Microsoft will be under close scrutiny again. Such is life when you are the biggest ...and the best.

The Microsoft Network is due to begin operating next year in 35 countries and 20 languages creating the first global online consumer service. Eventually users will be able to select what region on earth they want to reach. A Microsoft Network 'beta copy" demo ran nonstop at Comdex.

Microsoft will deliver some of the services — such as entry into the Internet, provide online support for its software products, offer e-mail and access to various encyclopedias and dictionaries. An electronic newspaper will run on a pay-per-view basis ...or by subscription.

Surprisingly, we heard that the service will not carry outside advertising ...at least not at first. In what amounts to free advertising, Microsoft will use the service to promote its own software and services.

Through an attractive revenue sharing arrangement and a new development tool (code-named "Blackbird") outside "high profile content providers" will anchor much of the new online service. We heard that Dow Jones, Reuters and Ziff-Davis ...and other major media companies had already signed up. Although no one is talking, Ziff-Davis' new "Interchange" online service could end up as being part of the Microsoft Network. Bill Gates is even rumored to be working with Hollywood on interactive programming.

For competitive reasons, Microsoft is not saying how much the new service will cost subscribers, but our understanding is that it will be less than the $10 a month average charged by competitors. We heard a $5 and an $8 monthly rate being tossed around. There is even talk that the service providers might dictate the cost on a per hour or per minute subscription basis.

Microsoft will use more than 200 Digital Equipment servers to run its online network, AT&T and Sprint will handle the telecommunications.

--W5YI Report 12/01/94

##########

Dear Jules W2JGR,

Re: Letter to the FCC

This letter to the FCC was written Sunday morn, but I did not mail it. Perhaps it would be Better if the whole ADRS would attack the problem of 14088 packet. I know you still like RTTY DX - that is great - even after 314 you still enjoy it a lot. So I am asking for you and the ADRS to make comments about this problem. The impact of the problem is on RTTY DX and you are the chief spokesman.

Any of my comments or data can be used by you, and you know how important this packet problem is - to DXers.

Congratulations on #314. I have only 215 and at the rate I am getting DX it will take 10 years to reach 300. If the packet keeps up I may never reach 300. Hi Hi.

*****

FCC Field Operations Bureau
12477 W. Cedar Dr.
Denver, Co. 80228

To the Agent-/n-Charge and To Whom it may concern.

On the 20Mtr ham band, there are 3 packet networks below 14100 khz (shown below) which literally "Own" their respective frequencies. They are un-attended stations mostly and they cause perpetual interference for other operators of other modes, especially RTTY operators.

The most interference is caused by the Mexican-Central American Net at 14088.3 khz Mark which operates with wideband packet at 1200 Baud. The least interference is caused by the N. American Net at 14096.3 mk 300 Baud. The Caribbean Basin Net also causes considerable interference at 14093.3 khz mk 300 Baud. (Add 2 khz for the SSB LSB frequency.) These stations are merciless because they are mindless Robots.

It is extremely important that the authorities undertake measures to stop the (NEW) interference at 14088 mk - now at this time - before packet obliterates everything. It appears that, as more and more stations and networks are added from all over the world, that the entire 20M band will be consumed by packet! It is an International problem. How do you deal with it?? How does anyone (the FCC Or the ARRL) tell Mexican or Central American operators what to do??

North American	**Caribbean Basin**	**Mexico-Central American.**
14096.3 Khz	14093.3 Khz	14088.3 Khz mk
14098.3 LSB	14095.3 LSB	14090.3 LSB
300 Baud	300 Baud	1200 Baud
WD9AGK	6Y5RA	XE3AY
VE3NUU	HI8GN	XE1ZAT
W1FJI	HK4LRM	TG9AXB
W8AKF	YV5AJ	XE2MMB
KA4P	HH2PK	TI0PAQ
WO0O	KP4TW	XE2SOC
W5XO	8P6RY	
W6MCV	VP2MO	
	YS1BOU	

THANK YOU,

John Rigsby, N0FAC
10644 Grant Dr. Northglenn, CO. 80233

EA RTTY CONTEST - 1995 RULES

Organized by "UN10N DE RADIOAFICIONADOS ESPANOLES (U.R.E.)", the EA RTTY CONTEST was created to promote activity in RTTY mode and is opened to radio amateurs world-wide.
DATE: 1600 Z Sat. to 1600 Z Sun., April 1 - 2, 1995.

BANDS: 10, 15, 20, 40 and 80 meters, according to 1ARU band plans..

CLASS: A) Single operator a11 band.
B) Single operator single band.
C) Multi operator a11 band only.
D) SWL's.

CALL: "CQ EA TEST"

MESSAGE: RST and CQ Zone .
EA stations send RST, "PREFIJO PROVINCIAL" and CQ ZONE. Contacts between stations world-wide are valids. No necessary to contact EA stations.

The spanish "Prefiaos Provinciales" are: A, AB, AL, AV, B, BA, Bl, BU, C, CA, CC, CE, CO, CR, CS, CU, GC, GE, GR, GU, H, HU, J, L, LE, LO, LU, M, MA, ML, MU, NA, O, OR, P, PM, PO, S, SA, SE, SG, SO, SS, T, TE, TF, TO, V, VA, VI, Z, ZA.

POINTS: on 10,15 and 20 m. bands, one for contacts within own continent, two for contacts outside own continent- On 40 and 80 m. bands, three for contact within own continent, six for contacts outside own continent.

Contacts between stations in the same DXCC country are valid for multiplier credit, but have zero point value.

MULTIPLIERS: CQ ZONES and Spanish Provinces ("PREFIJO PROVINCIAL"} on each band.

FINAL SCORE: total points in all bands x total multipliers in all bands.

TROPHIES: Award and plate to winner in class A}.
Award to winners in class B}, C} and D}

LOGS: Use separate 109 sheet for each band. Include a summary sheet showing the scoring and other essential information. Official log forms are recommended. Mailing deadline for all entries is May 15th 1995, to EA RTTY CONTEST MANAGER, ANTONIO ALCOLADO (EAIMV), P.O.BOX 240, 09400 ARANDA DE DUERO (Burgos) - Spain.

G-TOR Book Now Available

Kantronics has released a collection of articles describing the technical features of G-TOR. This 98-page, beautifully-bound book includes articles, charts, and protocol as published in QEX, Communications Quarterly, and Digital Journal, as well as the three articles presented at the 13th ARRL Digital Communications Conference.

G-TOR: The New Mode is available from book sellers, authorized Kantronics dealers, and Kantronics. For more information, contact your dealer or Kantronics at]_202 E. 23rd Street, Lawrence, Kansas 66046-5006. Phone: 913/842-7745. Fax: 913/842-2021.

Have you checked your mailing label lately?
If the ***Last Issue 01/95*** appears next to your name, it means your **ADRS** membership, and subscription to the ***Digital Journal,*** expires with this issue.
To keep your membership, and all the latest digital news coming your way, just fill out the coupon on page 29 and mail it -- **Today!**

WORK 95 IN 95

from Jay Townsend, WS7I

Here are a few more ideas for "95/95" DX extravaganza. We hear that there are thousands and thousands of DX-ers out there sitting and listening. Rumor has it that every DX-er sits on the 20 meter band tuning up and down just-a-waiting for that juicy new DX station to appear. In theory this might be true, but in practice I know of a wide spread telephone alerting system, not to mention the ever-present packet and DX Cluster spotting that does a much better job. Why even I get a few calls!

What we need to establish are a few good frequencies for the various modes. We also need to get a little of this DX over on 40 meters. RTTY DX is found in the segment 14.080-1 4.090 and I expect that to continue. On 40 we have a bit of a problem as the band isn't really used nearly enough for DX. Here on the "left coast" of the USA, long path 40 meters is a hot thing, but we seldom see much DX on that path except during contests. Let's see if in 1995 we can change that a bit. The segment 7.0307.045 is the normal DX window with JA's working down to 7.025. Let's get a couple of dozen folks working down there in 1995.

Clover on 14.65.5 is a hot spot for keyboard work and the "gentlemen" stay on the ".5" frequencies for Clover. Pactor seems to be hot at 14.069 and I am not yet sure about G-TOR. Please send in your observations so we can find some of these 'new' modes.

1 think we have gotten things going on a pretty positive note. Now, Jim N2HOS our esteemed publisher is offering a couple of special awards. One is for the top YL DX-er for the "95/95" and the other is for the youngest one (must be under 70! !). Let's look for the YL's in the pile-ups! (Look for the spedtic awards in the next issue),

Contest QSO's count toward your "95/95" total, of course, and we expect contest activity to be at a record high this year. And don't forget the WARC bands. 10mhz is hot almost all the time.

Don't forget, this is a log-only event. We will take the logs electronically either to Internet at: jayt@comtch.iea.com, or by mail at Jay Townsend WS71, PO Box 644, Spokane, WA 9921 0-0644. The fax number will be published next month.

Remember, Internet can be reached via MCI, CIS and Prodigy. Or you can leave your logs on the ADRS BBS. The number is 81 3 922 5904. Address the message to me, of course.

If any of you want to give a special award or a special recognition for your club or society, please send me a note right away. This is supposed to be a fun event and each of us should aim to achieve something new and interesting in the event.

73, Jay

The Last Word

from the Publisher

by Jim Mortensen, N2HOS • PO Box 328 • Indian Rocks Beach, FL 34635
CompuServe ID: 71573,1077

The New Year is here . . . and my desk clutter grows wider and deeper. No doubt a 1995 resolution dealing with orderliness is in order, if I worried about being politically correct. But the mere thought dismays me for the clutter is made up of gems and nuggets, small and large, which in combination represent a storehouse of great value. Articles for evaluation, flattering letter (s), inflammatory letters, ideas for articles, notes about interesting ideas gleaned from fertile sources, the stack for Tom, the pile from Tom, sundry computer disks and a mass of E-mail stuff—to be answered, remembered, considered, understood or tossed. All in all, it exudes a feeling of warmth, things-to-do, columns to write, people to see, talk to or call—a reminder perhaps, that as we begin our second year as publisher of this wonderful magazine we have more to look forward to than to worry about. And that, dear friends, is the sunny side of the street. I pause and relish the feeling, survey the desktop, enjoy the moment and cast aside any thoughts about a list of resolutions for this year. Maybe in 1996 . . . well, maybe one now. **I hereby resolve to disprove Adlai Stevenson's claim that "An editor is someone who separates the wheat from the chaff, then prints the chaff."** Enough said.

It's not that we don't share a few problems. And they are concerns subject to improvement if tackled with good, solid resolutions and respectable behavior. But we discussed them most of last year so surely there is no need to repeat slogans like "Listen first, then transmit;" "No party or group owns a frequency," or "A frequency in use is not available to any other station." Perhaps we might jot them down so we can pass them on to others not associated with the ADRS, though. And maybe even make an extra copy so we can leave one on the desk right next to the rig like I did . . . just in case our memory fails now and then, or our frustrations need a quieting thought or two.

And we surely don't need to be reminded that we are resolved to try a new mode in 1995, try some other band besides 20 meters, earn a plaque in the ADRS WPX contest, win a "Worked 95 in 95" DX certificate in more than one mode, put up a low band antenna for these days of dismal propagation. All are obvious tasks for the new year and we will get them done whether we make a resolution or not. Right? Yes, but we might make a note or two on the calendar, not as a resolution but as a mere timely reminder. Cheap insurance, you know.

Whatever your plan for the year, may it be another year of rewarding digital experiences, a year of growth in technical knowledge and a year in which you help at least one other ham learn all about the same kind of pleasures.

The hornet's nest arrived. First it was Jules W2JGR who claimed I was giving away the 20 meter DX window to Pactor. Then the heavy artillery arrived from Don W6PQS who blamed the "unused space" between the headphones of all too many amateurs (including by specific reference yours truly as one of the "low lifes" who might dare to send a brag sheet during a QSO). And that the RTTY portion of 20 meters is in use because "hundreds of DX-ers around the world are tuning carefully and listening intently for some barely audible rare DX." Not to be outdone, my good friend Eddie W6/G0AZT jumped into the fray but, as you will see in his letter elsewhere in this issue, he seems intent on proving RTTY's superiority as a contest/DX mode and that his log proves that the ADRS Board of Directors does not include enough Dx-ers (and the editorial staff is only slightly better off). John N0FAC, a late arrival, actually read my column and came up a couple of gems. "Had you actually proposed to move Pactor in the RTTY segment I would have said you were some kind of Digital Mutant that did not deserve to be publisher of the Digital Journal. On the other hand, you will be a big hero if you can find a way to stop the anti-RTTY Mode aggressors from forcing themselves into the 10 Khz RTTY DX window." He goes on to comment about some other aspects of the issue to be taken up next month, then concludes with a great war cry, RTTY FOREVER!, QSX DX 10 KHZ, QSW RTTY 20 KHZ!!"

Let's examine these comments. Don claims this sacred territory is in use because hundreds of people are carefully listening for rare DX. Let's assume for the moment this to be the truth and accept the classic picture of the dead-serious DX-er humped over his rig (except when retuning or expanding his antenna) as reality. It would make a nice illustration for the cover. Unfortunately, even if the dials and scopes and towers are busy listening all the time, the fact remains **the band is empty**. And if I am a packet BBS operator looking for open spaces, guess where I am going to land! If I am a newcomer to the digital modes why shouldn't I call CQ there, away from all the noise below 14.080 and above 14.090? Nature and ham radio abhors a vacuum. It is a void, a waste, an absence of matter . . . and even the most dedicated onlooker cannot alter such a condition until he chooses to participate, to be active, to enliven the emptiness.

Eddie claims at great length that Baudot is the mode of choice for contests and DX, and that thousands of folks make contact with rare stations in a contest. "RTTY is alive and well!" He's dead right. There is absolutely no argument about that. But let's see, there are twelve contests each year by his count, about 24 out of 365 days or a little less than seven percent of the time the band is available. Maybe, in this portion of the solar cycle, good DX occupies a similar share of the potential. Let's make it 10 percent. What remains, of course, is 80 to 85 percent of the band's potential. No wonder it sounds empty most of the time. And the comment about the ADRS board and the Digital Journal staff not being DX-ers or contesters? Hmmm. Let's see, did the board write the column? I thought I did and, besides, I suspect that both the board and the staff pretty well match the membership of the ADRS in terms of experience.

Finally, John who has some interesting thoughts for next months' column, concerns himself primarily with the "anti-RTTY mode aggressors" out there. But offers to make me a hero if I can come up with a solution to the problem.

I am now going to stir up some more discussion! There are some undeniable truths working here, some obvious, some hidden. First, RTTY is the mode of choice for contesting and DX-ing. Obviously there can be no argument. How then is the mode under attack from all these "aggressors?" Because it shot itself in the foot. The unspoken truth—while RTTY wins hands-down as the mode of choice for contesting or DX activity, the very same operators then either 1) abandon RTTY as their mode of choice for the rest of their on-air activity and utilize one of the TOR modes or 2) abandon digital all together for whatever their normal pursuit might be or 3) turn off the rig and wait for something exciting to happen.

Let me continue. Let me be politically uncorrect for another paragraph or two. This phenomenon, this abandonment of Baudot is aided and abetted by the DX-er's final solution, the DX Cluster. A wonderful tool, a truly great execution of its mission,

(cont'd on page 26)

DIGITAL DIGEST

News, Views, Tips & Reviews

Edited by Tom Arvo, WA8DXD • 4340 Watermill Ave • Orlando, FL 32817
CompuServe ID: 73330,1335

OPINION

More Controversy...

I have just finished reading "The Last Word" Dec. 94. Your remarks about the RTTY portion of the band could be explosive when misinterpreted, Hi Hi. Had you actually proposed to move Pactor into the RTTY segment I would have said you are some kind of Digital Mutant that did not deserve to be publisher of the DJ...Hi Hi. On the other hand, you will be a big hero if you can find a way to stop the anti-RTTY Mode Aggressors from forcing themselves into the 10Khz RTTY DX window.

Jules should get much more column space for his comments. He is the heart of the Journal (for DXers) and the first thing I turn to. The letter in the opinion column by WA3ZKZ, Oct. 94, (Subject IKM: Ideal Keyboard Mode) is only the tip of the iceberg that some people fear...that operators will return to RTTY after the experiment with ARQ, as well as look for a new IKM...eg. RTTY II. As Jules pointed out, perfect copy is not necessary with the IKM.

The manufacturers should start to think about a great demodulator to replace the rather poor ones they have produced, leading some operators to question weak signal RTTY. It is no wonder that the "unaware" step on weak DX stations that they can't "hear" or copy. However, those operators with good antennas and demods will not give up on the number one mode even during the sunspot minimum.

You said "Let's hear from more..." Well, I am only a reader of the DJ but to me The LAST Word is:

"RTTY Forever!"
QSX DX 10 Khz,
QSW RTTY 20 Khz!

73, John N0FA C

##########

RTTY is ALIVE and WELL!

In the October issue of the Digital Journal, Jim N2HOS suggested that PACTOR operators should go up as far as 14.885 before we lose that portion of the band due to non-activity. Jim obviously expected some "flak" and here it comes mate.

During CQWW 1992, our group made over 2222 contacts as P40RY, another 800+ in JARTS and 380 odd as P4/G0AZT outside the contest. This year, as 8R1TT, we made over 2888 contacts, before, during and after JARTS. I have never left any of the other seven "exotic" places I have been to, without having at LEAST 758 qsos in my logs, ALL on Baudot! I am sure that there are other DX-ped operators who will have topped these figures, which tends to point towards the fact that RTTY (Baudot), is still the BEST mode to operate in a contest or DX-pedition.

There are at least 12 RTTY contests per year, some allow burst modes for Qsos but I wonder how many contacts in last year's CQWW were made in AMTOR/PACTOR/G-TOR/CLOVER. Precious few, if any?

As I write this, there are three QSOs on Baudot on 28m and 4 on 15m. There is even someone sending strings of RYs. IS RTTY REALLY DEAD, hell no! Just because the casual listener doesn't hear any Baudot diddles for a few days, doesn't mean that everyone has deserted that mode in favor of copying pictures of the New York skyline, (Pactor), or wants to send gigabyte length files on G-TOR (AFSK and wide shift!!). Everyone should be allowed to pick which ever mode suits them for their needs, that is for sure, BUT Baudot should stay where it is, without the invasion of burst type modes. There is enough non RTTY activity between 888-895 without the ADRS condoning more!

As W2JGR/0 mentions in his DX column in the November issue, check the weekly VK2EG RTTY DX notes and see how many "spots" there are for Teletype compared to the burst modes! Check your packet clusters for confirmation, that RTTY DX is still alive and well. Ok, so there ARE DX stations working the burst modes, but they don't get into big pile-ups.

How many DX-peditions try to work Amtor, Pactor, G-TOR or Clover during their stay in rare places. You cannot work "split" operation in any of the burst modes due to "handshaking" requirements, so imagine trying to work a pile-up in Pactor ARQ.

Your rate would be about one an hour. Ask Tony, WA4JQS (3Y0PI) what happened when he tried to work AMTOR FEC to test his gear. Despite asking callers NOT to call in ARQ mode, they did and chaos reigned until Tony read the riot act.

It has taken RTTY fraternity, with the help of organizations like the IRDXA and others, many years to convince DX-Ped 'trips to take RTTY gear along with them. If these DX-ped operators cannot make many contacts due to QRM from the burst modes, then it is obvious that the organizers will not bother taking RTTY gear with them any longer. It is a question of economics, Q rate and also much less hassle from the point of view of the operators. Not all DX-ped RTTYers are as crazy as I am, and stick with the alphabet soup on their screens. It is too easy, just to switch off and go back to CW or SSB. Sometimes, I don't blame them for doing that!!

Interesting observation; of the 13 Directors/Officers of the ADRS, only two were found in the 8R1TT Dx-ped logs. Of the editorial staff, five members are in the log. Now i know that DXing or contesting in Baudot is not everyone's cuppa tea, but maybe there should be a Baudot representative on the board?? Any volunteers?? "Not I, said the spider to the fly".

LONG LIVE RTTY DX-ING AND CONTESTING.

73, Eddie Schneider. G0AZT

##########

The packet sysop's header controversy boils on. Hank W0RLI gave the discussion a light (but nonetheless serious) touch recently in a response to N2WX. "The standards effort dropped dead without resolution of many issues... With the continued bickering about NA vs NOAM, 'my BID is better than your BID,' 'too many headers/too little information in the headers,' 'don't you dare send it to ALL@WW,' we are getting nowhere. I plan to release some new servers in '1995: MUNGFHDR - randomly changes information in all headers on all messages. Many parameters available to the sysop. AUTODUP—duplicates random bulletins with random new BIDs. Alters the headers so the path back to the station running AUTODUP cannot be reliably determined. FLAMER—keys off a list of words found in the body of the message, then generates an automatic nasty message back to the sender, plus an automatic FLAMER bulletin in response. The path to the originator is obscured. GIFFER—Generates each day a 127 part GIF image. A nice image of the sysops tower, station or pet might be appropriate."
Hank continued, "these servers should help to move packet radio along the direction it is currently headed. Source code will be freely available." Well, at least they have a sense of humor.

##########

RTTY by WF1B

IMPORTANT UPGRADE INFO

The ADRS WPX contest is just around the corner—February 4th and 5th. 48 hours of non-stop fun. Ray WF1B says that software for the contest is now ready to be shipped. It comes with a very special feature called "Super Call Check." You can't afford to be without it. If you already have RTTY by WF1B, the cost of the upgrade is $5 for US and Canada, $7 for all others. Get it now!

(Last Word - cont'd from page 24)

the Cluster unfortunately spawned an entire population of operators who don't have to do one damned thing until the DX they want or need comes on the air! They can go to bed, out to dinner or to work and be paged if a "real rare one" comes up. I could if I wished work on the other side of the office and hear my multi-media computer say, "Jim, the 3Y0 is on the air now on 14082." And, I am sure there are those who are smart enough to go the final step and arrange an automatic contact at that point, untouched by human hands. And if that doesn't work, someone will fax or call to say that so-and-so is listening for my call. That is not what I call a challenging environment.

A true dilemma, this predicament will not go away. There is no way for me to become John's hero. There is no tooth fairy for RTTY users, no one to wave a magic wand and say "this frequency is in use, people might be listening on this frequency!" Neither rule nor regulation lends support, only a fading tradition. And that tradition based its strength on the principal of continued and active use of the space. No one, experienced or inexperienced then needed to be told it was RTTY space. They could tell because they could hear that lovely Baudot sound working DX, banging away at a contest or chatting with a friend (and a lot more of the latter than the former). I am truly sorry about its absence, but there is no way to reclaim the past unless RTTY users become regular instead of occasional occupants of the band. Get in the WPX . . . work "95 in 95," but do something now, before it is too late.

The ADRS WPX contest . . . it's just around the corner and scarcely a month away. Clear the weekend of February 4 and 5 of all interference now while you still have a chance to do so, get your antennas and rig in shape before you get snowed in, practice a bit, get your software tuned up and then make a splash in this "everybody can win" contest. The rules are published elsewhere in this issue. Keep in mind the concept of this affair. Virtually every contact can be a multiplier so, even if the propagation is abominable the contest will be a success.

No contest expert, I decided to ask Jay WS7I a few questions about how we go about piling up a score. He first talked about the joys of being a Multi-Multi station in WPX, "This contest is made for M/M's. Only they can compete in the entire 48 hour contest. And there is no need to have a super station to do a M/M. Just a couple of guys to keep it manned 24 hours a day for two days. It's about time that you got some of the other "locals" involved in the fun these contests bring to all of us. There is a big number of plaques for M/M so it is a very attractive opportunity."

Asked about what single ops might do, Jay rattled off a few of the unique characteristics of this contest. "Any mode can be used. Of course RTTY will be the mode of choice but we are hoping that some of you will attempt to play with the others. Low power will be the biggest class. And don't worry about listening to the DX Cluster. That's allowed, too, even though there won't be much of an advantage in a contest where there are so many potential multipliers."

"The score card is public, too. The exchange lets all the ops keep track of their respective position, though they don't know how many hours of off-time the other person has taken. But the open scoring should keep things at full pitch for the whole 48 hours. Strategy is the big thing in the WPX. You have to decide whether it will be better to be running them on 40 meters early in the evening or to save your time for plucking the Europeans when 15 meters opens up."

This is a contest for everybody, so don't miss it. Plaques and certificates abound. By the way, Ray WF1B will be shipping the RTTY software update by now (The upgrade is $5 for US/VE and $7 for all DX postpaid). If you don't have it, you had better get an order off pronto. Hal WA7EGA has also updated his software to support the WPX.

JOIN IN THE WPX FEBRUARY 4 AND 5
and don't forget . . .

"95 IN 95!" Let's make a joyful noise on the bands. Let's celebrate the pitiful propagation by proving to all that DX lives. Easy rules, any or all modes, logs only required, certificates and honors for all. Be the first person on your block to finish! Start now!

RagChew by KE5HE will, according to the latest word from Jim Jennings will be ready to ship in early January. This Windows program for the Hal PCI-4000/M has undergone extensive beta testing and, once the last few bugs get the treatment, it will be ready to go. Imagine the pleasure of running four modes in one easy-to-use interface. It is available only from the ADRS thanks to Jim's generous gift of the program's world-wide rights. The cost for members is $25, postpaid anywhere in the world, $50 for non-members. The program will be personalized with your callsign prior to shipping.

This issue of the Journal begins some notable series. Tom DL8FAK and Hans DL6MAA , no strangers to readers of the Digital Journal , start the story of Pactor-II as the cover story. Other chapters follow and will end with the Q&A session in the April issue. Please send your questions to the ADRS or, if you wish, directly to the authors. We very much appreciate the effort made by these two who jointly developed this latest step in digital technology. Dave WO5H begins his series on packet as well. Another chapter will follow every other month all year long. Dave wants questions as well for on the alternate months there will be a Q&A session on packet. Please send questions directly to Dave. His complete address is included as part of his column. We are delighted to have Dave as a regular contributor.

Not to be outdone, Crawford WA3ZKZ looks backward instead of forward and begins a wonderful examination of some of the monsters of the past. Not quite the dinosaurs of Jurassic Park, they do have an other-worldly look in this age of miniature wonders. Crawford is one of our better story tellers and I look forward to whatever comes next in this personal history. Thanks, Crawford, for a tale well told.

Next month—more Pactor-II, Joe Kasser of Lan-Link fame teaches us how to DX on the Internet, a new piece of software that will help you get to the right band at the right time in a SNAP, and all the good DX and contest news, and more. You can't afford to miss it.

73 de Jim N2HOS sk

(DX News - cont'd from page 19)

VATICAN, HV - HV4NAC, at the Vatican North American College, operates 20 meters around 1400Z. QSL via IK0FVC.

ZAMBIA, 9I - Fritz, DL7VRO, QSL manager for 9I2A, 9I2M, and 9I2Z was hospitalized due to an accident. Hopefully, by now he has been discharged, and has resumed his QSL chores.

HAVE DX NEWS?

Leave a message in the W5KSI Amtor mailbox (1), find me on RTTY, or via any of the following:
Packet: W2JGR @ WB0GDB.#STP.MN.USA.NA
Amtor: WJGR on 14070 khz.
Telephone: (612) 377 7269
FAX: (612) 374 8161 (mark for my attention), or use my CBA.

I will be able to receive all messages as above, since I am not going on a DXpedition to the "deep deep south", as was recently rumored!

THANKS - Thanks to the following for all your information: I5FLN, K7DSR, K0RC, N0FAC, W5KSI, WB2CJL, BARTG News/G3ZYP, and all the survey respondents.

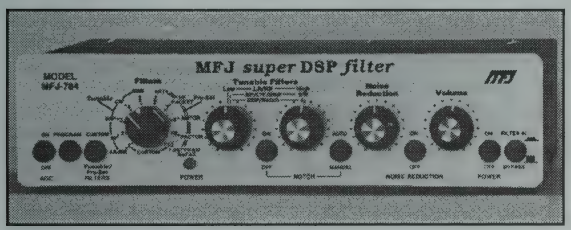
See you all next month. For now, bye bye from Minnesota, PAX....

73 de Jules W2JGR

(footnote)
1. W5KSI scans 7069, 7071, 7075.5, 7076, 14068, 14070, 14073.5, 14074, 14079, 21074, 21075, and 21079 khz.

MINI REVIEW

MFJ-784 super DSP Filter



For a several years I have examined each announcement of a DSP filter to try to determine if it was designed to assist reception in the digital modes. Most have been designed for SSB and CW, and only recently have we seen units designed for our modes. In addition to SSB and CW, the MFJ-784 contains preset optimal filters for RTTY, AMTOR, PACTOR, SSTV & FAX, and HF Packet, as well as the capability for the user to program filters of his own design. The bandpass for RTTY is set to 250 Hz, and for PACTOR it is 440 Hz. (If those bandpasses don't suit you they can be changed by moving a jumper.) In the digital modes the unit gives "brick wall" response with attenuation of up to 50 dB attenuation to signals just 60 Hz away. In addition you can tune the lowpass, highpass, notch, and bandpass filters to eliminate interference, the adaptive noise reduction can be switched on or off, and AGC keeps the audio output level constant.

In the past I've added narrow CW and SSB filters to my TS440S, but the CW filter was too narrow and the SSB filter not narrow enough for RTTY. The transceiver's notch and IF shift helped some when QRM was bad, but there was a lot of room for improvement. With all this in mind, I decided to purchase the filter and see if it performed in BAUDOT and PACTOR as the specs indicated. I am pleased to say with enthusiasm that it does!

The manual is very complete and well-written. Installation is simple; in most cases you need only connect the filter to a 12 volt power source, and insert it in the audio line before the TNC or speaker and/or headphones.

I hooked the MFJ-784 up on a Sunday afternoon and started tuning around with the filter out. At about 14081 I heard weak RTTY with strong adjacent PACTOR interference. I switched in the filter and copied C21/JA as he turned it over to a W6. The Nauru station had not yet been announced on the cluster so I swung the beam in his direction, called him, and he responded to me. A new country within the first two minutes of use, and I was very pleased! I then tried the unit on PACTOR and was amazed at the way that a signal becomes S9 when before it was S4 or so with QRM. In the digital modes, if a preset fixed filter does not suit your needs you can switch to a tunable filter where you can tune the center frequency and the bandwidth, and as you narrow the bandwidth, interfering signals drop away.

The performance on CW was very similar, and you can use the two tunable notch filters to eliminate adjacent signals if necessary. On SSB I parked on the XF4M dxpedition to listen to the pileup. The early morning static crashes were louder than most signals until I turned on the noise reduction which eliminated most of them; it is really very effective. Now I adjusted the low pass and high pass filters until his signal was exactly in the passband and was armchair copy. These steps are actually easier and quicker to perform than they are to describe.

In summary, the MFJ-784 is now permanently installed in my shack, and finally I can eliminate most QRM and noise just by pressing a switch. The filter does perform as advertised on the digital modes as well as on CW and SSB, and it is fairly priced at $220 (available at major suppliers for less). It makes operation a great deal more pleasant under trying conditions.

reviewed by Bob Boyd, W1VXV

Connect to the FCC via Internet

The Internet can be used to "officially" communicate with the FCC. It is apparently sufficient now to comment to the Chairman, send a copy of the message to each Commissioner and two hard copies to the Secretary of the FCC. (to be safe we would also send hard copy to each member of the Commission as well.) They can be reached as follows:

Chairman Reed Hundt	rhundt@fcc.gov
Commissioner James Quello	qclark@fcc.gov
Commissioner Andrew Barrett	bettyf@fcc.gov
Commissioner Susan Ness	sness@fcc.gov
Commissioner Rachelle Chong	rchong@fcc.gov

The commission can be reached at:
191 9 M Street NW, Washington, DC 20554.
The Secretary is Mr. William Caton, at the FCC.

Another ADRS BBS!

Al, W2TKU (a director of the Society) who recently went QRT with his Winlink operation has now opened up a full-time BBS. The number is **813-922-5904**. This runs around-the-clock on a dedicated line and is devoted entirely to ADRS activities. Here is where you will find the latest in contest scores, late-breaking DX info, basic digital software and updates, interesting shareware, news bulletins, Digital Journal mid-month newsletters; where you can post your messages to other members, file your "95/95" DX contest results, send messages to Digital Journal columnists (or even the publisher!), get a membership application for the friend down the street. Register now. It is a very simple routine and will open up a new world of communication for you. All modem speeds up to 19.2! Meanwhile, Dick W4KALJ continues to serve the ADRS as well. He will mirror the files on Al's BBS and will be happy to introduce you to his other services as well. Join in the land-line revolution now and watch each issue of the Digital Journal for interesting files available to you.

HOW ABOUT DX-ers?

Season's greetings to all from snowy Spokane in Eastern Washington state. It's been a long year and Ron AB5KD and I have spent a lot of time in putting together the upcoming ADRS WPX. That should satisfy most of the hard core contest folks, but what about the DX-ers?

Consulting with Betsy WV7Y the new "expert" and because of some pushing from the Publisher N2HOS (who must have some special juice to keep his ideas flowing—probably scotch), we came up with a great idea for 1995.

It's the DX-er's dream. WORK 95 COUNTRIES IN 1995! Send in the paper log or an electronic one and get a nice certificate. This DX event is open to all digital modes and endorsements are available for Clover, AMTOR, Pactor, G-TOR, RTTY, ASCII and even Packet.

I plan on concentration on Pactor. I have the gear hooked up and I am raring to go. The first person to submit a winning log will get some kind of special award, as will the first to submit a two-mode log, three-mode, etc. Lock for the listings in the Digital Journal as they come in during the year. The contest starts at 0001Z on January 1, 1995 and continues throughout the year.

Logs come to me in Spokane:

Jay W. Townsend WS71
PO Box 644
Spokane, WA 99210-0644
Internet: jayt@comtch.iea.com

The last line is my Internet address and its good for electronic logs. It should be reachable for MCI, CompuServe and AOL.

This ought to give DX-ers something to do for 1995 and will keep you active even at the bottom of the sunspot cycle. 80 and 40 meters are really booming now so look for some activity on those bands. The rules are simple. Try 30 and 17 meters, too. Let's get some DX-ing activity on some of these "exotic" modes and have some fun in 1995.

See you in the pileups ... **95 in 1995** ...
let the fun begin.

73, Jay WS71

HOTEL ROOMS FOR DAYTON '95 - ORDER NOW!

If you plan to attend the Dayton Hamvention in 1995 and will need a room, the ADRS has reserved a block for your convenience. These rooms are at the Radisson Inn (north). This is where the digital gang stays. This is where special events will be held. Forums, hospitality suite, and the Digital dinner will are take place right here. Stay where all the action is - reserve a room today.

The rooms will accommodate from one to four people. The room rates are $86.00 per night. The hotel will need a deposit of $80.00 per room. We must know if you need a room NOW. We do not need your deposit money at this time, only your request. You will be advised later on when to send your deposit money.

To reserve a room, contact Dale Sinner, W61WO via one of the following methods.

Phone/FAX (619) 723-3838

Mail to: 1904 Carolton Lane, Fallbrook, CA 92028

CompuServ: 73074,435

Dayton Hamvention dates are:
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by Joe Kasser, W3/G3ZCZ

New in the 2nd edition — updated information based on the comments and suggestions of readers including a chapter on operations via Internet Wormholes and &II LAN-LINK 2.30 documentation. What packet radio is. What it takes to use it. The Local Area Network (LAN). The Packet Bulletin Board System (PBBS) and how to use it. How to Send and Receive Messages & Bulletins. The distributed LAN. Extending your range via Nodes. Packet Clusters. Servers: Dumb and smart. ELMER The ham's expert system. LANLINK manual and evaluation disk.

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RS-232C and COM PORT booklet: This is a compilation of all articles published in past issues of the RTTY Journal on these two very important topics. If you are using a computer in conjunction with Ham Radio, you will find this booklet an invaluable tool to have in your shack. The booklet contains information about COM ports 1,2,3 and 4 as well as the RS-232C information. Send $5.00 to the ADRS, PO BOX 2550, Goldenrod, FL 32733 and you will receive a copy of this invaluable booklet by return mail, postage paid.

For Sale - AEA PK-64 with HF modem, Commodore C-64, disk drive, printer, Sanyo monitor, all cables and documentation. Worked DXCC and WAS RTTY with this gear. Sold as a system only $175.00. Dovetron MPC-1000R-II $250.00. Barry Fox, W1HFN, 431 Mulpus Road, Lunenburg, MA 01462 Ph: (Days) 603-889-6600 Ext 320 (leave voice mail if not there); (e-mail) fox@imagitex.com (eves) 508-582-7521.

For Sale - PCI-4000 HAL CLOVER board. Complete with cables and software. $600, I ship. Certified check or Money Order. Gary Kaehler, W7DCR, P.O. Box 750 LaPine, OR 97739; 1-503-536-3153.

BACK ISSUES - All Back Issues of the Following: RTTY Digital Journal - ATVQ - A5 SPEC-COM & ATV TODAY. Write for list & prices - SASE - ESF Copy Service, 4011 Clearview Dr., Cedar Falls, IA. 50613 (319) 266-7040

PCI-3000, PK-232 and RTTY/CW SOFTWARE FOR IBM-CP! With new features like Terminal Emulator window for TNC for DX Cluster! Contest features include ON-THE-FLY duping! CompRTTY 11/PCI uses bus interface on PCI-3000. CompRTTY II/PK uses host mode of PK-232 for complete control. CompRTTY 11/STD is for all other TUs. Supports COM3/COM4. Full editing of both transmit and receive text! Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file send/receive, customizable full screen logging with duping, 24 programmable messages. $65.00 Send call letters (including MARS) with order. C.O.D. add $3.00 Call (315) 469-6009, or send check to: David A. Rice, KC2HO, 4452 Ashfield Terrace., Syracuse, NY 13215

RTTY CONTEST SOFTWARE: This is the program used by WINNERS. RTTY by WF1B is the premier teletype contest software. Supports CQWW, ARRL, SARTG, BARTG contests. New DXpedition mode recently used by AHIA. Supports HAL PCI-3000, PK-232, KAM, MFJ-1278, UTU, AMT-1, and Standard TUs. Online features: Automatic duping, Automatic multiplier identification, Automatic scoring, Mouse support, Break-in buffer, Buffer tags for dynamic custom transmissions, File transfer. Post Contest features: Complete paperwork generation, QSL labels, Statistics. Call (401) 823RTTY for fact sheet. IBM-PC, $41.95 (US/VE) $44.95 (DX). Specify disk size. Wyvern Technology, 35 Colvintown Road, Coventry, RI 02816-8509

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Wanted For Museum: Apple-1 and other pre-1980 microcomputers. Also early microcomputer journals, newsletters, and advertising literature. KK4WW, (703) 231-6478 / 763-2321.

For Sale: HAL ST-6000 with plug and play wiring for Yaesu FT-990 or FT-1000. Includes software. Mint condition in original factory carton. Also includes manuals. Ron KK4CR, Phone (813) 783-2327. $225.00 OBO

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AEA INTRODUCES FAX III

Advanced Electronic Applications, Inc. (AEA) recently began shipping the new AEA FAX III. AEA FAX III is a stand-alone, multi-intensity, gray-scale, HF weather fax demodulator and display software package allowing amateur operators to colorize received weather fax images. This "pseudo-color" feature allows users to choose from 256 colors to clarify images or just to make them more appealing. Export images to GIF or PCX files for manipulation in other graphics programs, then include the images in newsletters, letters, or other publications.

This IBM-compatible software receives satellite maps and WeFax images in 16 levels of gray. Maps and images can be displayed in 16 levels of gray or in dazzling color using a VGA monitor. AEA FAX II1 also works with EGA and CGA monitors. In addition to images, AEA FAX III also receives and decodes CW, RTIY, and NAVTEX transmissions.

Suggested retail price for AEA FAX III is $149.00 and is available from your favorite amateur radio dealer. Upgrades from earlier versions of AEA FAX may be purchased directly from AEA by calling (206) 774-1722.

AEA ANNOUNCES PC PakRatt 2.0

Advanced Electronic Applications, Inc. (AEA) is proud to offer version 2.0 of the powerful PC PakRatt for Windows computer program. PC PakRatt for Windows 2.0 is a full-blown Windows application for controlling the entire AEA family of data controllers. including the PK-900, DSP-1232 and DSP-2232, as well as the industry standard PK-232MBX and the PK-88. This new version now supports the PK-96 1200/9600 bps Packet controller and the PK-I 2 1200bps Packet controller.

PC PakRatt for Windows 2.0 makes operating your data controller easy. PC PakRatt for Windows 2.0 can run two AEA data controllers simultaneously. Run HF or VHF Packet, AMTOR. BAUDOT. Morse Code, ASCII, Signal Analysis, NAVTEX, PACTOR, or Dumb Terminal modes all through PC PakRatt for Windows. All options are just a mouse-click away.

PC PakRatt for Windows 2.0 is now fully compatible with Log Windows 2.0. This means users have the powerful TNC control of PC PakRatt for Windows 2.0, coupled with the great database, logging, and tracking features of Log Windows 2.0.

Sending and receiving ANSI graphics in PACTOR is now possible. Users now have access to this exciting form of computer art with PC PakRatt for Windows 2.0.

MailDrop operation is more powerful with an increased buffer size. MailDrop even makes it easier to "read, write, and file messages with redesigned windows.

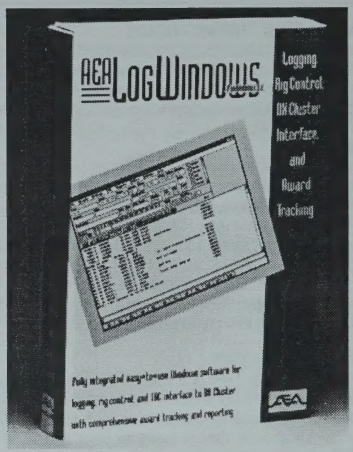
Other great features included in PC PakRatt for Windows 2.0 are: a Packet Monitor Window for displaying monitored packets, custom parameters for 9600bps packet operation, split-screen operation, on-screen status, file transfers, macros, QSO logging, menu-driven help. on-screen parameter lists, separate windows for each data controller, and much more.

Suggested retail price for PC PakRatt for Windows version 2.0 is $129.00 and is available from your favorite amateur radio dealer. Upgrades for PC PakRatt for Windows 1.0 are available directly from AEA by calling (206) 774-1722.

For more information, contact: Advanced Electronic Applications, Inc. P.O. Box C2160 . Lynnwood, WA 98036

NEW PRODUCTS

AEA NOW SHIPPING LOG WINDOWS 2.0



Logging, rig control, and DX cluster monitoring with award tracking and reporting it's all here and much more with Advanced Electronic Applications' new Log Windows version 2.0.

This new version of Log Windows is now compatible with AEA's PC PakRatt for Windows version 2.0. Users can have the superior TNC control of PC PakRatt for Windows 2.0, coupled with the powerful logging and tracking of Log Windows.

Antennas can be turned to the short path, long path, or in an arbitrary direction, with the click of a mouse.

A new Database Browser enables users to sort and print logs by any criteria. Users can also query on-line callbook databases such as SAM, QRZ, or HAMCall for a callsign at any time.

Log Windows 2.0 was created to automatically display DX spots and allow users to move to the designated frequency quickly, log the contact, and then save the information in a log. Log Windows 2.0 has the ability to announce DX spots with a voice-synthesized DX announcement. A filter can be turned on so Log Windows 2.0 will only display and sound an alarm for DX that are needed, preventing unnecessary spots from distracting people from other tasks. Users can display the 30 most recent DX spots, choose one to enter in the display, and grab it. This automatically sets the transceiver frequency and mode, and prepares the logbook to record the contact. Log Windows 2.0 does not require an AEA TNC.

The stand-alone LW Import program allows all these logs to be imported into Log Windows 2.0: CT, DXLog, Log Master, Easy DX, Hyperlog, DX Base, N6RJ 2nd Op, Log View, DX Desktop, PC PakRatt, and any ASCII log. Logging and award tracking are supported for: ARRL DXCC, WAS, VUCC, and CQ Magazine's CQ Zone and US-CA awards.

Updating official ARRL DXCC list prefixes in databases is easy with the special utilities built into Log Windows 2.0. Log Windows 2.0 also allows users to: print QSO labels, prim logbooks, see information displayed by the local Packet Cluster and change the frequency and mode of the transceiver to the frequency shown by the Packet Cluster.

Suggested retail price for Log Windows 2.0 is $99.00. Upgrades for Log Windows 1.0 are available directly from AEA by calling (206) 774-1722, weekdays from 8:00 a.m. to 4:30 p.m. Pacific time. Log Windows 2.0, as well as the rest of AEA's high quality product line, is available from your favorite amateur radio dealer.

For more information, please contact:
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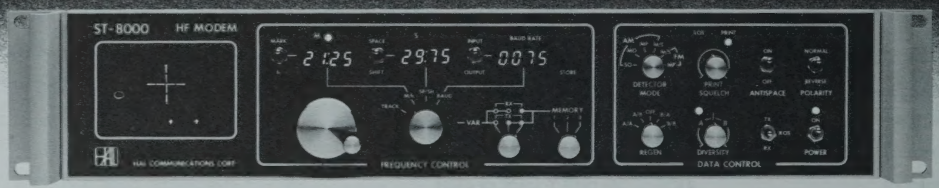

ST-8000 HF Modem

Real HF radio teleprinter signals exhibit heavy fading and distortion, requirements that cannot be measured by standard constant amplitude BER and distortion test procedures. In designing the ST-8000, HAL has gone the extra step beyond traditional test and design. Our noise floor is at -65 dBm, not at -30 dBm as on other units, an extra 35 dB gain margin to handle fading. Filters in the ST-8000 are all of linear-phase design to give minimum pulse distortion, not sharp-skirted filters with high phase distortion. All signal processing is done at the input tone frequency; heterodyning is NOT used. This avoids distortion due to frequency conversion or introduced by abnormally high or low filter Q's. Bandwidths of the input, Mark/Space channels, and post-detection filters are all computed and set for the baud rate you select, from 10 to 1200 baud. Other standard features of the ST-8000 include:

- 8 Programmable Memories
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- Adjustable Print Squelch
- Phase-continuous TX Tones
- Split or Transceive TX/RX
- CRT Tuning Indicator
- RS-232C, MIL-188C, or TTL Data
- 8, 600, or 10K Audio Input
- Signal Regeneration
- Variable Threshold Diversity
- RS-232 Remote Control I/O
- 100-130/200-250 VAC, 44-440 Hz
- AM or FM Signal Processing
- 32 steps of M/S filter BW
- Mark or Space-Only Detection
- Digital Multipath Correction
- FDX or HDX with Echo
- Spectra-Tune and X-Y Display
- Transmitter PTT Relay
- 8 or 600 Ohm Audio Output
- Code and Speed Conversion
- Signal Amplitude Squelch
- Receive Clock Recovery
- 3.5" High Rack Mounting

Write or call for complete ST-8000 specifications.

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